AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

DECEMBER 1, 1958

In This Issue

Molten Aluminum Delivered to Ford Foundry
Meaning of General Aviation to National Economy
Automatic Gear Line for British Motor Corp.
Design of New Liquid Cooled Service Brakes
New Vehicles at the British Automobile Show
Automatic Riveters for Dorsey Trailer Bodies

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A CHILTON PUBLICATION

Shutdowns for lubrication cut in half with

RYKON

Grease

Dollars in production time saved by using RYKON in high temperature service at Northwestern Steel & Wire Company

You expect more from STANDARD and get it!

Bearings on the 46-inch blooming mill manipulator and side guard carrier had to be lubricated twice each eight-hour shift before RYKON Grease was used. The mill had to be shut down while the lubrication work was performed. Now with RYKON, the bearings are greased once each shift. Maintenance men find rollers and pins are still well lubricated. The rollers are subject to almost constant heat and water washing. Steel blooms heated to approximately 2300° F. are just 18 inches away from the RYKON lubricated bearings. The lubricating properties of the grease are unaffected by the heat.

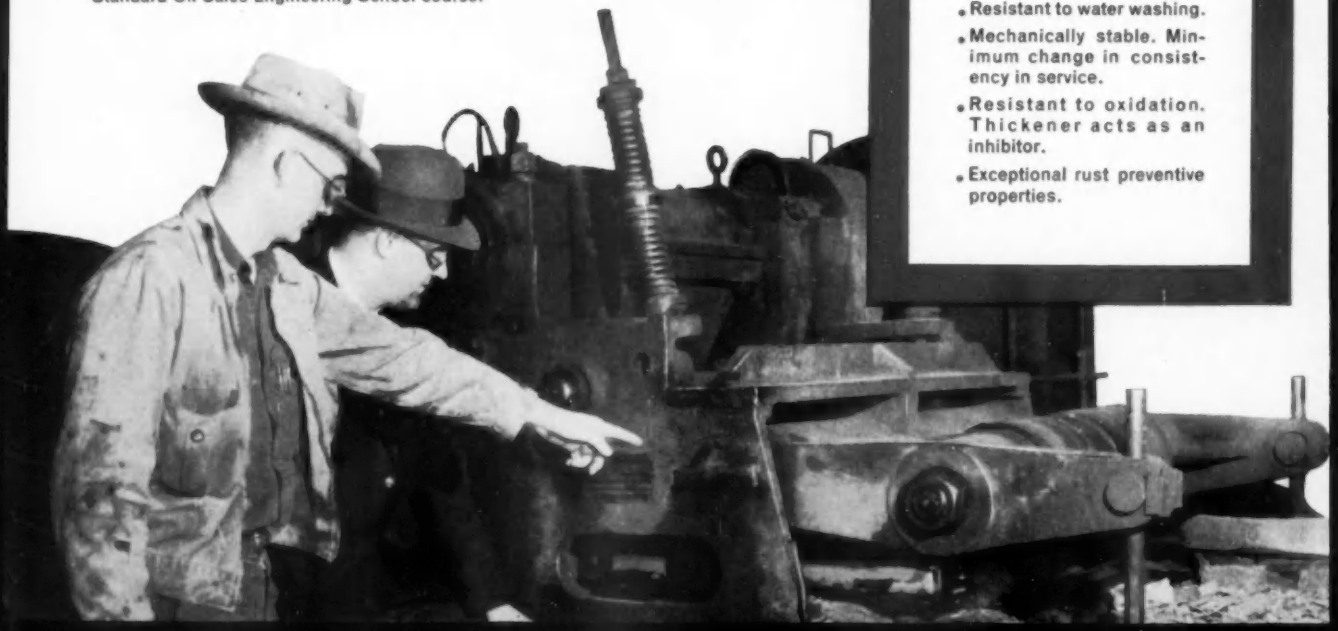
RYKON Grease delivers similar performance results elsewhere in the plant. In roller bearings on the reheating furnace charging tables, in pinch roll bearings and in other trouble spots, where heat and continuous water washing would make short work of other greases, RYKON stands up to the test.

A unique nonsoap, organic thickening agent gives RYKON Grease the ability to provide lubrication in tough-to-lubricate spots long after other greases have failed. This thickener is the result of five years of research effort by a Standard Oil grease research team working to develop an outstanding industrial grease. RYKON Grease is a true multipurpose grease capable of performing all lubrication jobs on one piece of equipment or often in an entire plant.

More facts about RYKON Grease are available from the Standard Oil lubrication specialist that is near you in any of the 15 Midwest and Rocky Mountain states. Call him. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

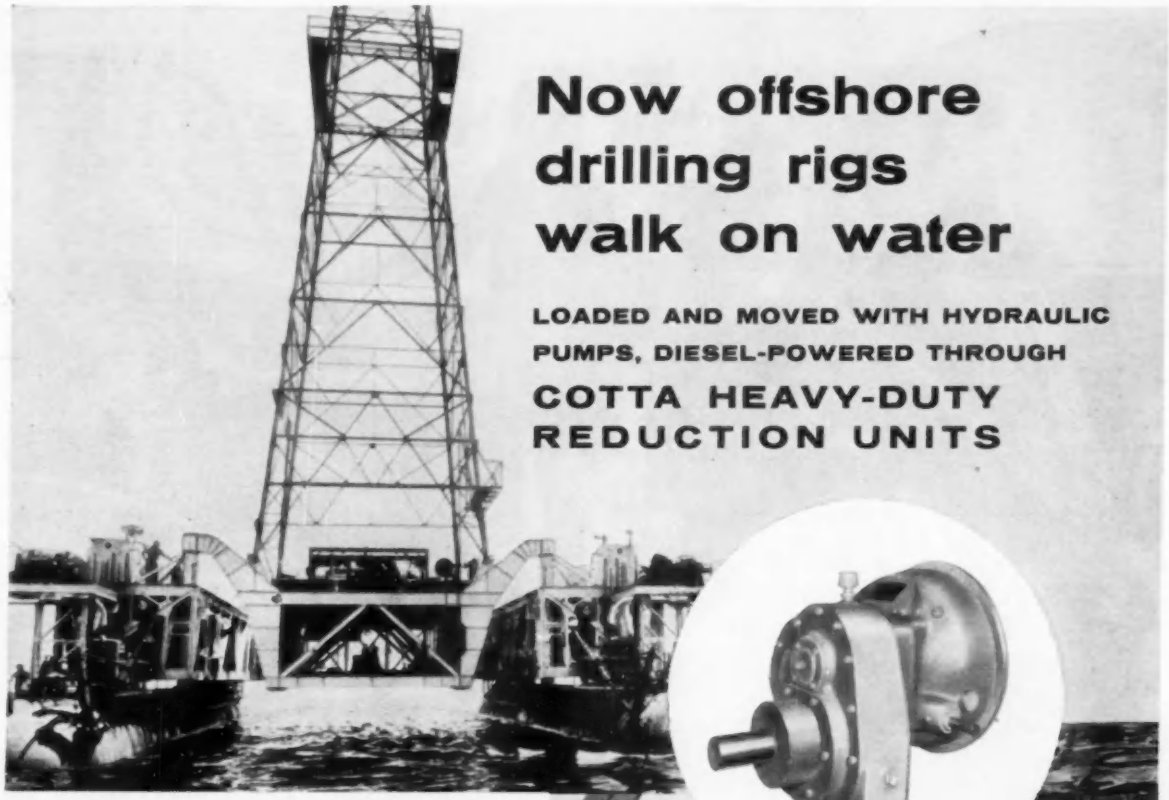
Circle 220 on Inquiry Card for more data

Lubrication time cut. Mill feeder pinch roll bearings formerly lubricated twice each eight hours. Now with RYKON Grease, lubrication is needed only once each shift. Elbert Dean, Northwestern Steel lubrication engineer, and Standard Oil lubrication specialist, Charles Daub, inspect bearings. Counseling people who have lubrication jobs like this is work for which Chuck Daub is well-qualified. Chuck has 12 years' experience in lubrication technical service work. He has an engineering degree from Illinois Institute of Technology and has completed the fifteen week Standard Oil Sales Engineering School course.



Quick facts about
RYKON Grease

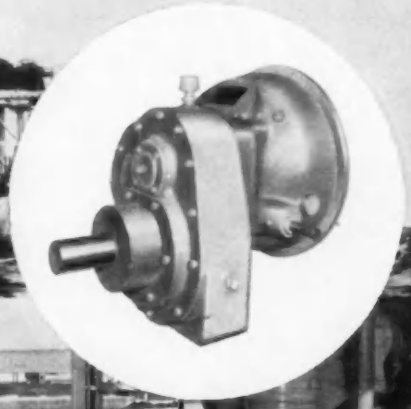
- Stable at high temperatures. At sustained high temperatures RYKON Grease remains soft and grease-like.
- Resistant to water washing.
- Mechanically stable. Minimum change in consistency in service.
- Resistant to oxidation. Thickener acts as an inhibitor.
- Exceptional rust preventive properties.

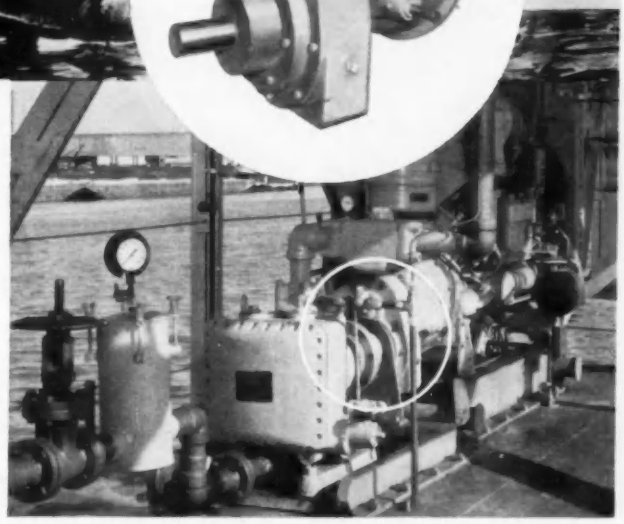


Now offshore drilling rigs walk on water

LOADED AND MOVED WITH HYDRAULIC PUMPS, DIESEL-POWERED THROUGH

COTTA HEAVY-DUTY REDUCTION UNITS





Whether your heavy-duty power transmission problem is an ingenious new concept, or just a need for maximum ruggedness and efficiency in the 150 to 2000-lb torque range, you can rely on Cotta for the unit you need.

"Rigmover No. 1," above, picks up an entire Creole Petroleum Company offshore drilling rig, takes it to another drilling site, and properly positions it on the new foundation. The "Rigmover" lifts and positions through hydraulic rams and is propelled by Vickers hydraulic motors. Power is furnished by three Caterpillar D-337 diesel engines, each of which drives a Vickers hydraulic pump through a Cotta SR 12E 930 2:00 to 1 reduction gear. Four 150-hp motors drive screws in both ends of the two pontoons. Lifting capacity is 200 tons. Operated on Lake Maracaibo, Venezuela, the "Rigmover" was designed by Sverdrup and Parcel, Inc., St. Louis, built in New Orleans, by Higgins, Inc.

Select from a wide choice of standard transmissions and gear reducers or specify your unit "engineered-to-order." Heavy-duty Cotta Reduction Units and Transmissions by the thousands serve big pumps, winches, drilling rigs, trucks, rail cars, etc.

THIS INFORMATION WILL HELP YOU

Sent free on request — diagrams, capacity tables, dimensions, and complete specifications. State your problem — COTTA engineers will help you select the right unit for best performance. Write today.

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

An Assurance of Dependable Service

COTTA

HEAVY-DUTY REDUCTION UNITS

"Engineered-to-order"

Circle 223 on Inquiry Card for more data

She's looking for flair...He, for wear

...heavy Nickel-chromium plating sells both of them!

Lustrous chrome can accent your new car's styling...make it smarter, sleeker ...enhance car colors...combine styling flair with years and years of wear.

That's because heavy Nickel plating does four important things under the chromium:

1. It makes a smooth, white-metal foundation for the carefree beauty of chromium.

2. It protects steel and other basis metals from rust and corrosion.

3. It backs up the chrome surface and cushions it against cracking under impact.

4. It gives the designer full freedom in choosing the basis metal most suitable for the purpose.

With these four advantages, your customers can keep their trim, their cars, looking showroom bright with just ordinary washing.

She looks for flair...*he* looks for wear ...heavy Nickel-chromium plating sells both of them, and *keeps* them sold.

More information? Write for our new booklet "Practical Answers to 40 Practical Questions about Nickel Plating."

The International Nickel Company, Inc.
67 Wall Street New York 5, N. Y.

Nickel plating...under chrome...over base metal: That's how a good finish for trim is built up. Chrome gives shining beauty. Nickel plating makes the beauty last. Basis metal suits production economy.

INCO TRADE MARK **Inco Nickel** *makes metals perform better longer*

AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE — PUBLISHED SEMI-MONTHLY

DECEMBER 1, 1958 — VOL. 119, NO. 11

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AUTOMOTIVE PRODUCTS

Distinctive STYLING

Skillful ENGINEERING

Careful MANUFACTURING

Dependable CONTROL

KING-SEELEY CORPORATION
ANN ARBOR, MICHIGAN

AUTOMOTIVE HARDWARE

GAUGES
- Ammeters
- Fuel Level
- Oil Pressure
- Special Purpose
- Temperature
- Voltmeters

GOVERNORS
- "Servo" Mechanical—Diesel
- Handy
- Vari-Speed-Velocity
- Visible—Action

INSTRUMENT CLUSTERS

INSTRUMENT PANELS

ODOMETERS

REGULATORS, CONSTANT VOLTAGE

SERVO MECHANISMS (Heater Control)

SIGNALS
- Fuel Warning
- Oil Pressure Warning
- Oil Level Warning
- Special Purpose
- Speed Warning
- Temperature Warning

SPEEDOMETERS

SWITCHES
- Delay Relay (Ride Control)
- Inhibitor (Automatic Shift)
- Oil Pressure
- Special Purpose
- Temperature

TACHOMETERS

5096

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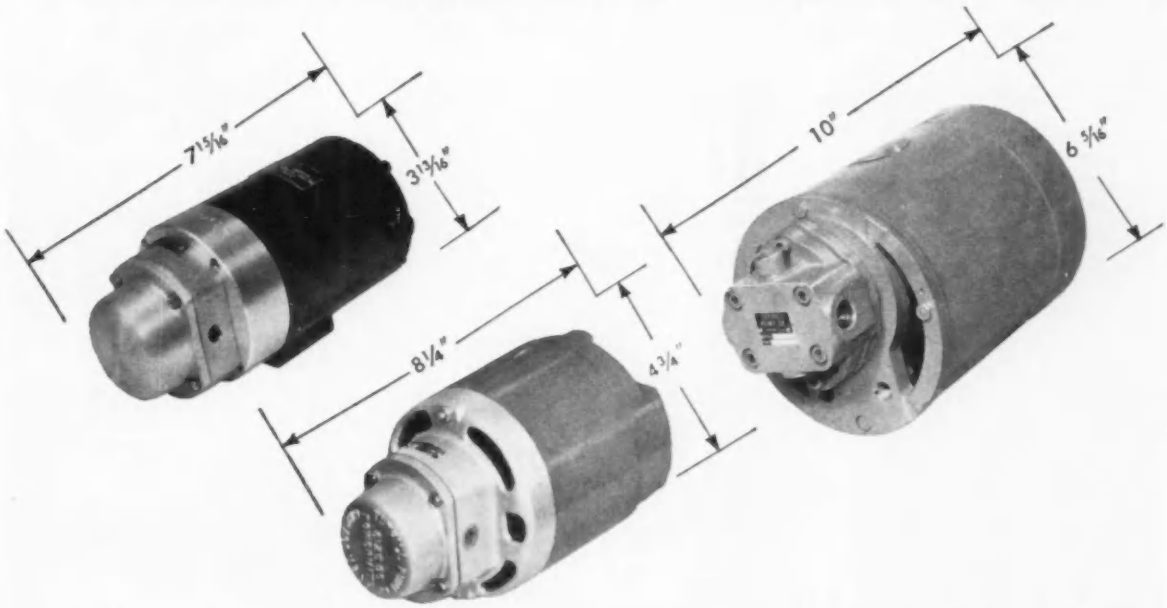
Cut Product Costs with **POWERMITE**



custom engineered pump and motor combinations

More and more manufacturers are learning the economy of incorporating Tuthill's exclusive Powermite Pump and Motor Combinations in their products. These custom engineered units incorporate a specially designed electric motor into a rotary gear pump . . . to produce a combination unit which takes up no more space and weighs no more, than a conventional electric motor.

The Powermite's compactness solves tough design problems. Its small size and low weight make it easier to install . . . boost production line productivity. The elimination of bases, couplings and other parts result in substantial economies. Its lower weight reduces shipping costs. And all Powermites provide the long trouble-free life which industry has learned to expect from Tuthill.

Wide range of combinations

A wide range of pump and motor combinations can be provided to meet individual requirements in hydraulics, lubrication, circulating, coolant, and other pump services. Three typical examples are shown above.

The compact unit to the left, developed for use on a small mobile hoist, combines an internal gear pump rated for 30 cu. in./min. at 500 psi, with a $\frac{1}{8}$ hp motor. The center unit, developed for a low pressure hydraulic application combines an internal gear pump with a capacity of 16 gph at 250 psi with a $\frac{1}{12}$ hp motor. The unit at right combines a high pressure hydraulic spur gear pump, for rated conditions of 1 gpm at 1,000 psi with a $\frac{3}{4}$ hp motor.

Custom engineered for your application

Each Powermite model is custom engineered for a specific OEM application and is designed to permit substantial economies for high volume production. A few Powermite models are available from stock—for example, the 350 psi, 16 **gph** model shown at center above. For small quantity applications Tuthill Close Coupled Pump and Motor Combinations can provide similar savings.

Manufacturers interested in learning more about the advantages of incorporating Powermite combinations into their products are invited to forward detailed specifications. Or, if preferred, a Tuthill Field Engineer will call.

TUTHILL PUMP COMPANY
941 East 95th Street
Chicago 19, Illinois

Gentlemen:

☐ Please have representative call to discuss Powermite applications in my product.

☐ Please send catalog describing complete Tuthill line.

NAME_____ TITLE_____

COMPANY_____

STREET_____

CITY_____ STATE_____

PUMPS FOR YOUR PURPOSE

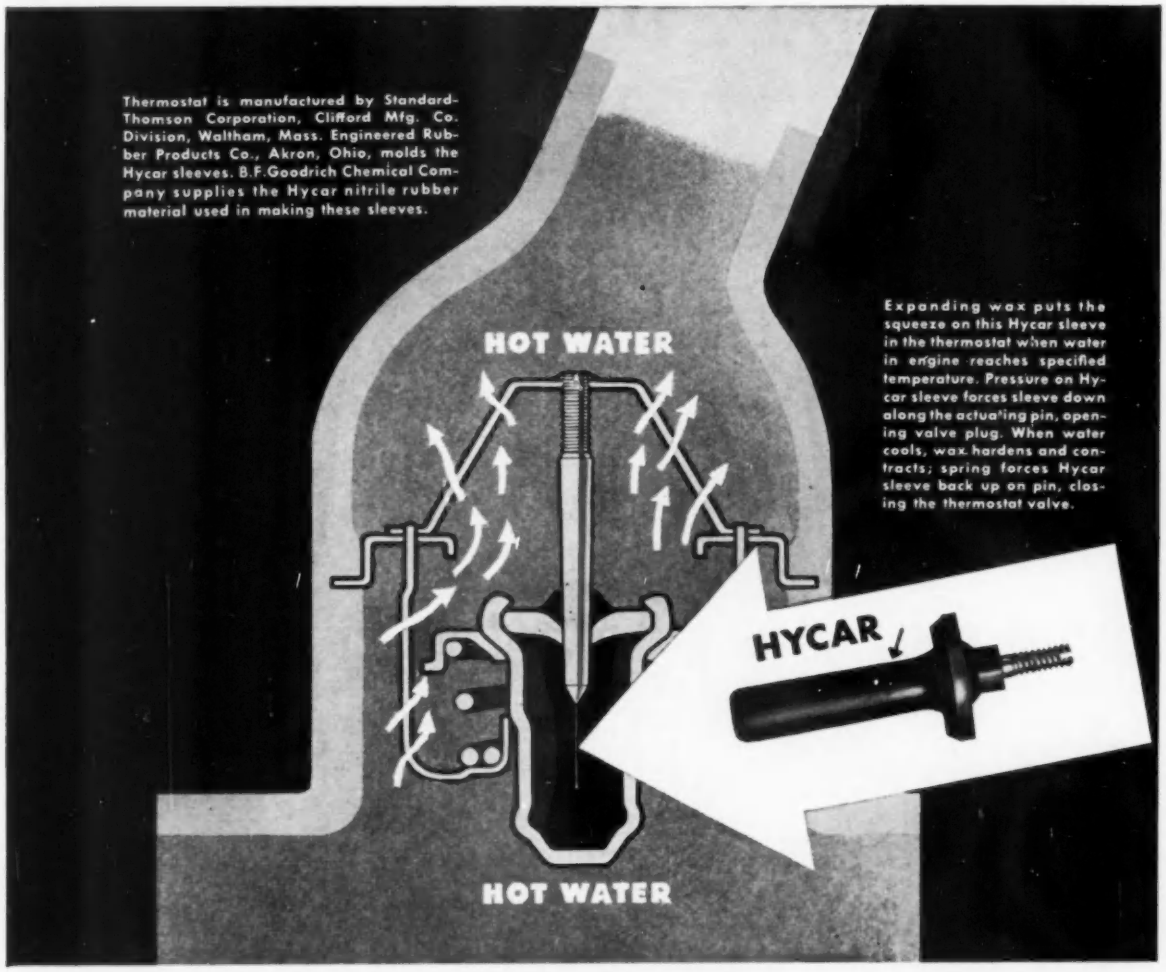
TUTHILL PUMP COMPANY

NFPA NATIONAL FLUID POWER ASSOCIATION

Circle 226 on Inquiry Card for more data

Another new development using

B.F.Goodrich Chemical *raw materials*


Thermostat is manufactured by Standard-Thomson Corporation, Clifford Mfg. Co. Division, Waltham, Mass. Engineered Rubber Products Co., Akron, Ohio, molds the Hycar sleeves. B.F.Goodrich Chemical Company supplies the Hycar nitrile rubber material used in making these sleeves.
HOT WATER
Expanding wax puts the squeeze on this Hycar sleeve in the thermostat when water in engine reaches specified temperature. Pressure on Hycar sleeve forces sleeve down along the actuating pin, opening valve plug. When water cools, wax hardens and contracts; spring forces Hycar sleeve back up on pin, closing the thermostat valve.
HYCAR
HOT WATER

Hycar controls heat of automobile engine operation

A SLEEVE of Hycar nitrile rubber solves a thermostat operating problem of high pressure cooling systems. Hycar is ideal because it is not affected by antifreeze chemicals or heat. It provides flexibility with high strength and exceptional resistance to volume change and abrasion.

Hycar nitrile rubber makes possible improved existing products and new products, too. Get information on it by writing Dept. KF-6, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Hycar
American Rubber

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich

GEON polyvinyl materials • HYCAR American rubber and latex
GOOD-RITE chemicals and plasticizers • HARMON colors

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Project Alert Working at UDYLITE *Produces for You...*

SILICON EFFICIENCY, RUGGEDNESS AND LONG LIFE

for old rectifiers

1. **A SPECIAL PRODUCT . . .** For the first time, a Udylite-engineered, Udylite-built *silicon* replacement stack is offered for you to use in revitalizing your Udylite magnesium-copper-sulphide or selenium rectifier and upgrading its performance to the level of today's best. *And you can do this in your own shop*, without delay, at a minimum of expense and down time.
2. **A SPECIAL SERVICE . . .** As an alternate plan, your old rectifier can be returned to Udylite for *factory* installation of the silicon replacement stacks by trained rectifier specialists. At the same time, your rectifier will be completely overhauled and tested so that it will be returned to you renewed and ready for the longer life and high efficiency of Udylite silicon.
3. **A SPECIAL VALUE . . .** This whole program is set up as a Project Alert. A special department will handle your order and your equipment from start to a completely satisfactory finish. A *guaranteed delivery* will keep your down time to a minimum. With prices based on a production line plan, you will get more value per dollar spent than you ever before thought possible.

Let Udylite help you get your entire plating operation in top working order and ready to go at peak capacity. Your Udylite sales engineer will be calling on you soon. But if you need priority service, write, phone or wire directly to:

the udylite corporation

detroit 11, michigan • world's largest plating supplier

PROJECT ALERT

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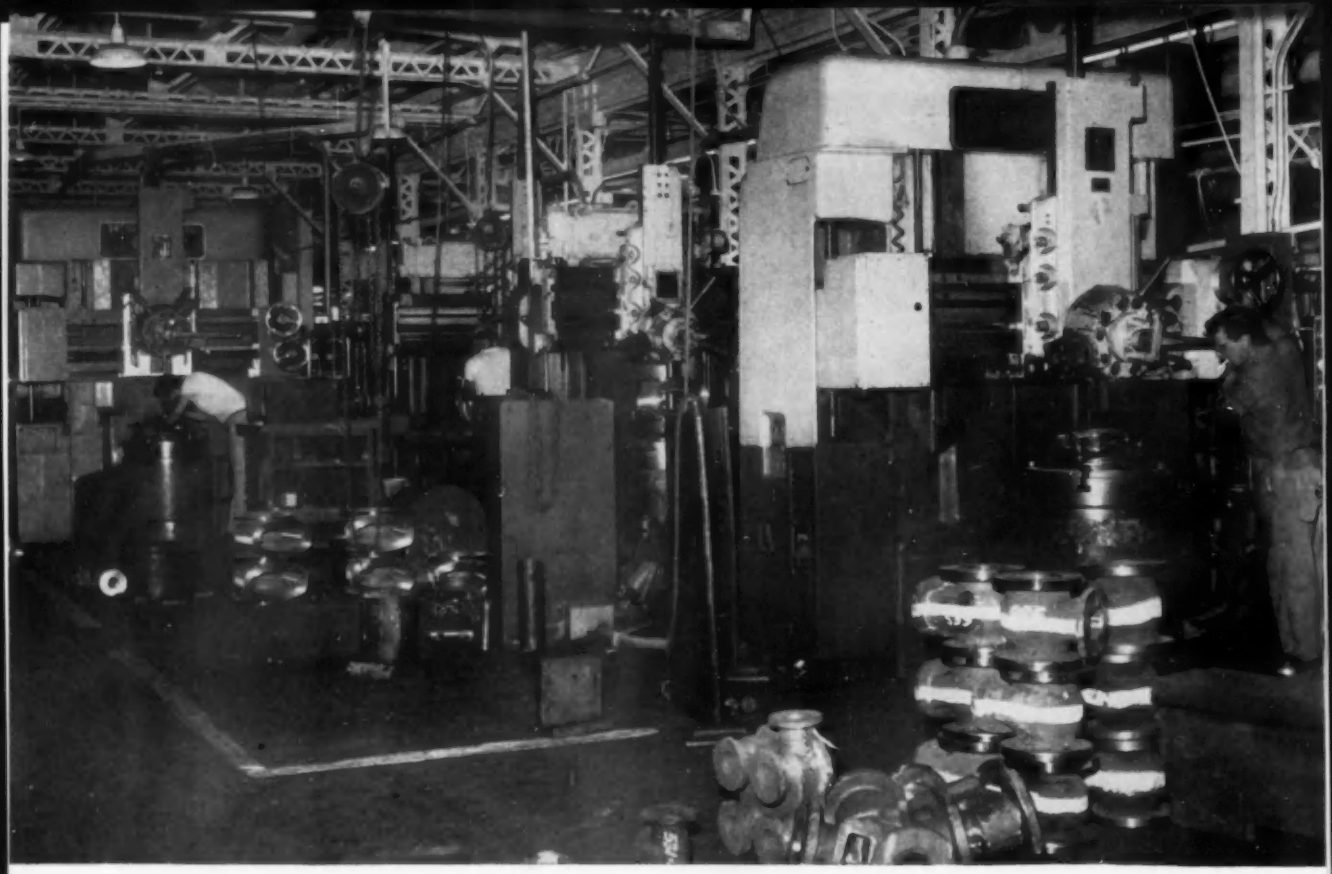
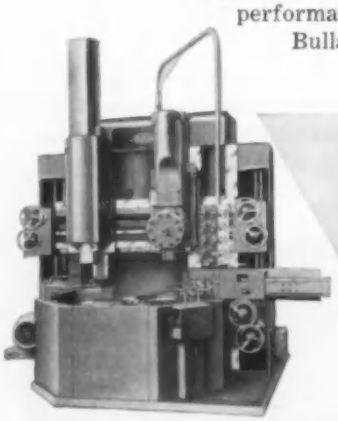


"they're GOOD machines"

BULLARD

A veteran of 39 years with the Newport News Shipbuilding and Drydock Company, Mr. L. G. Webb, Foreman, further said "a large volume of valve bodies, hubs or levers for hydraulic turbines and various other parts to be machined are handled most efficiently on our Bullard Model 75 Vertical Turret Lathes." Replacing Bullard V.T.L.'s of an earlier design, which gave them excellent performance, this company has a battery of ten Bullard Cut Masters, Model 75, ranging in size from 26" to 66".



The same dependable day-in and day-out cost cutting performance delivered by Bullard Cut Master V.T.L.'s, Model 75, can be applied to your machining work — have a Bullard Sales Engineer show you the many benefits of replacing your outdated equipment.

THE BULLARD COMPANY
BRIDGEPORT 9, CONNECTICUT

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OSTUCO WELDED TUBING

solves your fabrication puzzles

Product design dilemmas . . . or production problems? Solutions to these perplexing puzzles fall right into place *naturally—with Ostuco Welded Tubing.*

First, Ostuco Welded Tubing is one of the most versatile of all materials. It can be subjected to virtually every fabricating operation known.

Second, we can perform any one or more of these fabricating operations. That means you add us to your production line without investment in equipment, inventory or plant.

Third, when you deal with Ohio Seamless you're dealing with tubing *experts* . . . men who can recommend the *exact* Ostuco Welded Tubing to suit your product and processes. Just contact our nearest sales office, or the plant at *Shelby, Ohio—Birthplace of the Seamless Steel Tube Industry in America.*

AA-7961

FIFTY YEARS
OSTUCO
OSTUCO TUBING
1908 1958

OHIO SEAMLESS TUBE DIVISION

of Copperweld Steel Company • SHELBY, OHIO

Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

SALES OFFICES: Birmingham, Charlotte, Chicago (Oak Park), Cleveland, Dayton, Denver, Detroit (Huntington Woods), Houston, Los Angeles (Lynwood), Moline, New York, North Kansas City, Philadelphia (Wynnewood), Pittsburgh, Richmond, Rochester, St. Louis, St. Paul, St. Petersburg, Salt Lake City, Seattle, Tulsa, Wichita. CANADA: Railway & Power Engr. Corp., Ltd. EXPORT: Copperweld Steel International Company, 225 Broadway, New York 7, New York.

SELECT-O-PUSHLITE

ANNOUNCING

TWO NEW SPACE-SAVING, COST-SAVING WESTINGHOUSE PUSHBUTTONS

Either of these two new pushbutton designs can replace three separate units on your control panel! Save you up to 60 percent on panel space!! Save you 25 percent on initial cost!!!

Both function as a start button, a stop button and an indicating light—all in one compact, oiltite selector unit!

SELECT-O-LITE is a low-voltage *release* unit which is operated by a mere twist of the button—to on-off, start-stop—any combination you desire.

SELECT-O-PUSHLITE is a low-voltage *protection* device which operates only when the button is turned, *then pressed*—an added safety feature for critical operations.

Select-O-Lite and Select-O-Pushlite are available from Westinghouse—the same company that first brought you Pushlite and Push-To-Test pushbuttons. For detailed dimensions and ordering information, please contact your nearby Westinghouse sales office. Or write: Westinghouse Electric Corporation, Standard Control Division, Beaver, Pennsylvania. J-30303

YOU CAN BE SURE...IF IT'S **Westinghouse**

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS," CBS TV MONDAYS

Circle 231 on Inquiry Card for more data

10 to 100 times the wear resistance of other dry bearings

Comparative Thrust Washer† Performance

Type of Material	Mean Testing Time	Reason for Stopping
DU Composite	1000 hrs.	Completed 1000 hrs.
T.F.E. in porous Bronze	213 hrs.	.005" wear
Graphite & Lead Bronze	158 hrs.	.010" wear
T.F.E. + 25% Graphite	134 hrs.	.005" wear
Oil impregnated Bronze	105 hrs.	.010" wear
Phenolic resin + MoS_2	73 hrs.	.005" wear
T.F.E. + 25% Glass fibre	48 hrs.	.005" wear
MoS_2 Treated Steel	26 hrs.	Seizure
Graphite (bearing grade)	24 hrs.	.005" wear
Porous Bronze + MoS_2	17 hrs.	.005" wear
Asbestos + resin + MoS_2	0.8 hrs.	.005" wear
Nylon	0.3 hrs.	.010" wear

† *Thrust Washers used for comparative tests as most indicative of true relationship of values, since clearances do not enter into their performance.*

Compare performance and you will agree that DU—the steel-backed porous-bronze bearing with solid T.F.E.* fluorocarbon resin-lead lubricant—offers an entirely new conception of dry bearing service.
Consider its high compressive strength with no cold flow (up to 23 tons per sq. in.)—its extremely low friction with no slip-stick characteristics—its equally efficient performance at temperatures from −320° F to +536° F—its immunity to solvents, detergents, alkalies, corrosive chemicals, abrasive atmospheres—and you will find the answer to many difficult bearing problems where conventional lubrication is impractical or undesirable.
Ask your bearing manufacturer or write for engineering brochure to

SPECIAL PRODUCTS DEPT.
United States Gasket Co.
Camden 1, New Jersey

*TEFLON, *Du Pont Trademark*
*FLUON, *I.C.I. Trademark*

United States Gasket *Plastics Division of* **GARLOCK**

CALENDAR

OF COMING SHOWS AND MEETINGS

First Electronic Computer Exhibition, London .....Nov. 28-Dec. 4

American Society of Mechanical Engineers, annual meeting, Statler and Sheraton-McAlpin Hotels, New York ....Nov. 30-Dec. 5

National Defense Resources Conference, sponsored by Industrial College of the Armed Forces, Departmental Auditorium, Washington, D. C. ..Dec. 1-12

63rd Congress of American Industry, sponsored by National Association of Manufacturers, Hotel Waldorf - Astoria, New York, N. Y. .....Dec. 3-5

2nd National Symposium on Global Communications, St. Petersburg, Fla. .....Dec. 3-5

Industrial Engineering Conference, sponsored by Illinois Institute of Technology, at Illinois Institute of Technology, Chicago, Ill. .....Dec. 4-5

Smithfield Show and Agricultural Machinery Exhibition, Earls Court, London .....Dec. 8-12

4th Convertible Aircraft Congress, Franklin Institute, Philadelphia, Pa. .....Dec. 16

125th Annual Meeting of the American Association of the Advancement of Science, Washington, D. C. .....Dec. 26-31

1959

SAE Annual Meeting, Sheraton-Cadillac and Statler Hotels, Detroit, Mich. .....Jan. 12-16

49th Annual National Motor Boat Show, New York Coliseum, New York, N. Y. .....Jan. 16-25

Chicago Automobile Show, International Amphitheatre, Chicago, Ill. .....Jan. 17-25

American Society of Lubrication Engineers, First Annual Gear Symposium, Morrison Hotel, Chicago, Ill. .....Jan. 26-27

Institute of Aeronautical Sciences, 27th annual meeting, Sheraton-Astor Hotel, New York, N. Y. Jan. 26-29

Plant Maintenance & Engineering Show, Public Auditorium, Cleveland, O. .....Jan. 26-29

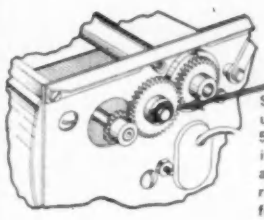
5th Annual Midwest Welding Conference, sponsored by Armour Research Foundation and Chicago Section of American Welding Society, at Illinois Institute of Technology, Chicago, Ill. .....Jan. 28-29

First International Symposium on Nuclear Fuel Elements, sponsored by Columbia University and Sylvania-Corning Nuclear Corp., at Columbia University, New York, N. Y. .....Jan. 28-29

Circle 232 on Inquiry Card for more data

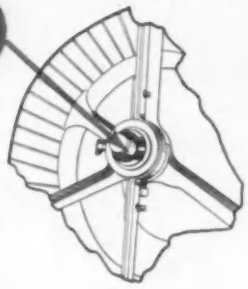
Truarc Rings Eliminate Parts and Machining, Speed Assembly, Reduce Manufacturing Costs

Ring eliminates nut and threading, saves $365/M



Sanborn Co., Waltham, Mass., uses a Waldes Truarc Series 5555 Grip ring* to secure the idler gear assembly of its portable electrocardiograph. The ring assures faultless gear performance necessary for diagnostic accuracy, eliminates a nut and threading operation for savings of $365 per 1000 units.

Ring saves parts, speeds assembly for savings of $260/M

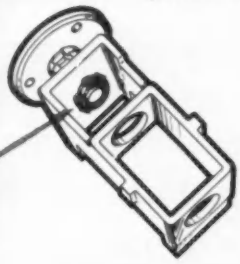


Fraser and Johnston Co., San Francisco, Calif., uses a Series 5555 Grip ring* to secure the fan shaft and speed assembly of its furnace blowers. The ring eliminates a collar and set screw for savings of $180/M on materials, $80/M on assembly time—a total of $260 per 1000 units.

2 standard rings replace 4 special parts, save $170/M

Sanymetal Products Co., Inc., Cleveland, O., uses a Series 5005 Self-locking ring and a Series 5103 Crescent® ring* to hold the escutcheon plate and handle of this doorlatch for toilet compartments. The two standard rings replace four expensive chrome-plated brass parts for savings of $170 per 1000 units.

Ring replaces spring and washer; speeds assembly 50%, saves $15/M



Allen-Bradley Co., Milwaukee, Wisc., uses a Series 5139 Prong-Lock ring* to secure the adjustment knob of its pneumatic timer. Ring eliminates a costly coil spring and washer, simplifies a tough assembly operation. Cost saving: $15 per 1000 units. Assembly time saving: 50%.

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REGIONAL MANAGERS

CHICAGO—Carl A. Zehner
360 North Michigan Ave.
Chicago 1, Ill.
Phone RAndolph 6-2166

DETROIT—Thomas L. Pickrell
103 Pallister Ave.
Detroit 2, Mich.
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New York 17, N. Y.
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High Spots of This Issue

▼ Molten Metal Delivered to Ford Foundry

Automotive history was made last October with the opening of a new Ford aluminum foundry adjacent to an aluminum reduction plant. The metals plant delivers molten alumina in huge pots directly to holding furnaces in the Ford plant. The entire operation is covered here. Page 30.

▼ London Motor Show

The London Motor Show marked a bumper year in the fortunes of the British motor vehicle industry. With sales booming, the trend was mainly toward conventional designs. Most notable changes were in engine power and body lines, with Italian stylists in the ascendancy. Page 32.

▼ General Aviation and the National Economy

Sometimes overlooked in the spate of publicity about military and commercial aviation is the steady growth of general aviation. Estimates are that retail sales of general aircraft will hit $1 billion in the next five years. First of two articles on the general aviation outlook. Page 36.

▼ Churchill Automatic Gear Line

One of the most advanced examples of automation in the British motor vehicle industry is a 175-ft gear line that turns out completed four-gear countershafts from blanks in 25 minutes. The production sequence is described here. Page 42.

▼ White Trucks Haul Maximum Loads

White Motor Co.'s new line of trucks are designed to meet the "needs of tomorrow." The new series, detailed here, features lightweight construction, compact design, and Diesel engines up to 262 hp. Page 49.

▼ 17 New Product Items And Other High Spots, Such As:

Liquid-cooled brakes; farm equipment report; automatic riveter; motor vehicle registrations; Great Lakes Steel Corp.; automation news report; metals; and industry statistics.

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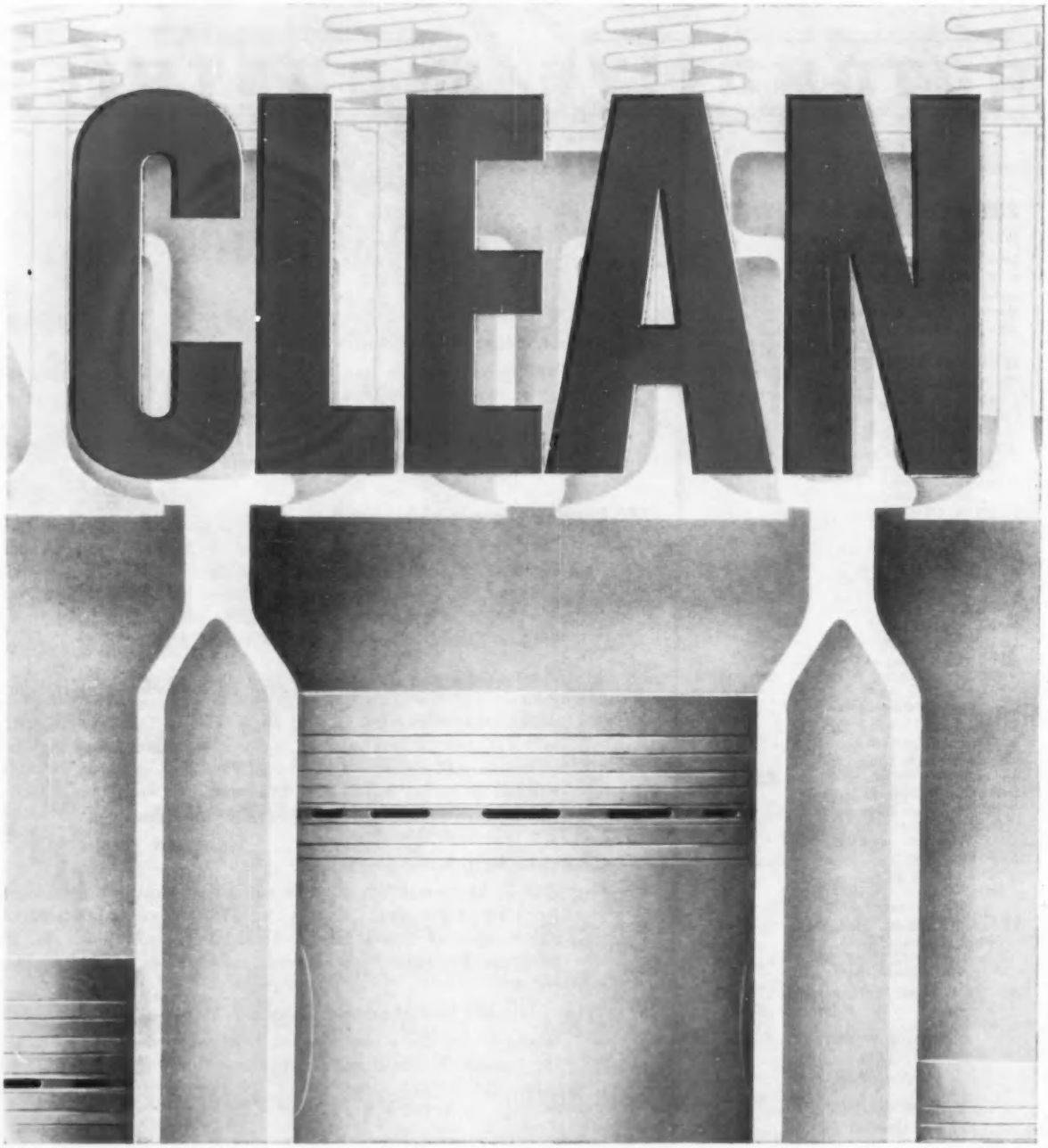

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News

OF THE AUTOMOTIVE, AND AVIATION INDUSTRIES

Vol. 119, No. 11 **December 1, 1958**

Output Resumes at Chrysler As UAW Salaried Workers Sign

Chrysler Corp. climbed back to steady production after it settled a six-day strike of 8000 UAW salaried employes.

At the start of the strike, UAW officials directed production workers to stay at their jobs. Truck drivers refused to cross picket lines, however, and parts shortages soon crippled 32 Chrysler plants across the nation, idling some 61,000 workers.

The three-year contract that ended the strike stresses seniority and job transfer clauses. Salaried workers will be given transfer rights after five years' seniority and vacancies will be filled with laid off employes from the same plant unit.

Hourly workers get transfer rights only after 12 years, and vacancies are filled alternately from the plant unit and the area wide pool.

Chrysler's total output of cars and trucks for the week of the strike was only 6581 units, compared with 20,464 the week before.

Meanwhile, a strike of some 1100 UAW members at the Budd Co. in Gary, Ind., forced American Motors to suspend assembly operations at Kenosha and Milwaukee, Wisc., for two and one-half days. Budd supplies AMC with underbodies. AMC resumed operations Nov. 18 after Budd workers voted to return to work, although the strike was still unsettled at the time.

In other labor news, the UAW and John Deere Co. reached agreement on a three-year contract patterned after the automobile settlements. The new contract covers 16,000 employes in eight Deere factories in Illinois and Iowa.

More than 36,000 employes of International Harvester were idled by a strike that began Nov. 13. Fifteen plants were closed by the strike, as well as several parts depots under local agreements. One of the UAW's major demands was to include the parts depots in the master agreement.

NSU SPORT PRINZ HAS REAR-MOUNTED ENGINE

NSU Sport Prinz, styled by Berthone of Italy, has a rear-mounted two-cylinder engine with overhead camshaft. Powerplant displaces 35.5-cu in. and develops 30 hp. Suspension is all-independent with coil springs, swing axles being used at the rear. Body and chassis are of integral construction.

Checker to Start Producing Passenger Car This Month

Production of the long-awaited family-type Checker passenger car was scheduled to begin Dec. 1 at Checker Motors Corp. plant in Kalamazoo, Mich. Public introduction is slated for mid-January.

Morris Markin, Checker president, said the new vehicle will be called the Superba. A separate production line has been set up at Kalamazoo to produce up to 100 passenger cars a day.

Checker announced more than a year ago its plans to bring out a specially styled passenger car (AI Nov. 1, 1957, p. 35) for summer introduction, but tooling delays set the program back several months.

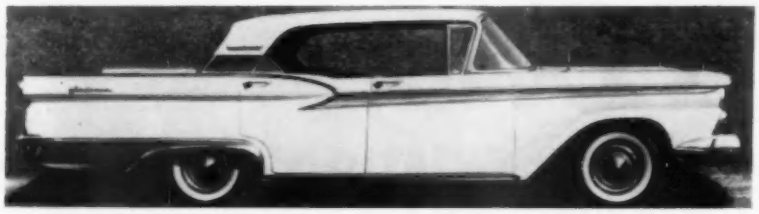
The Superba will fit into the "small car" category with 120 in. wheelbase and overall length of only 200 in. It will not be as low as most standard U. S. passenger cars. Power will come from a Continental six-cylinder OHV engine.

Markin said recently that market research has uncovered a "substantial" demand for a car like the Superba, which will "perform like a pleasure car and take punishment like a taxicab.

"Our studies showed that there are many thousands of car owners seeking a practical automobile with greater riding comfort, more interior seating space and shorter length than are now available in conventional cars," he said.

Basic styling will be similar to that of current Checker taxicab models. The difference will be in such features as dual headlamps, distinctive grille, chrome trim and windshield curve. Paint, of course, also will be different. Power brakes, power steering and automatic transmission will be available.

NEWS AUTOMOTIVE AND AVIATION



Ford Div.'s new luxury series in the 1959 line—the Galaxie—includes six different body styles and is priced to sell only $48 above comparable models in the Ford Fairlane 500 series. The Town Victoria four-door hardtop model shown here has many of the styling features of the 1959 four-passenger Thunderbird.

Steel Output in Detroit Mills Hit All-Time High in November

Steel production in Detroit area mills rose to an all-time high during November, spurred by renewed activity in the automobile industry.

A new high was set during the week ended Nov. 22, with production of some 140,000 tons. Output for the month was at a rate better than 90 per cent of capacity.

The previous weekly high was in February, 1957, when area mills produced 137,800 tons, or 106 per cent of capacity.

The lower percentage in November was due to recent increases in rated capacity at McLouth Steel Corp. The McLouth capacity was boosted in early November from 1,812,000 tons to 2,040,000 tons, making McLouth second only to Great Lakes Steel Corp. in the Detroit area. McLouth sells a large percentage of its output to General Motors.

McLouth had an earlier boost in capacity last summer. The latest increase is due to "greater efficiency of operations" at the company's mills.

Total capacity for the Detroit area mills, according to Chilton's *The Iron Age*, now stands at 7,638,600 tons a year, compared with 7,172,600 tons at the beginning of 1958.

1959 English Ford Prices Slightly Higher in U. S.

Ford's MEL Div. announced that suggested retail prices of the 1959 English Ford line are slightly higher than last year.

The division, which markets the cars in this country, said that $22 has been added to cover higher distribution costs.

Suggested prices, however, now include a $10 installation and preparation charge, formerly an extra.

Prices now range from $1601 for the two-door Anglia to $2915 for the Zodiac Mark II convertible. These are Detroit and Chicago port of entry prices and include Federal excise tax, ocean freight and handling, and import duties.

Reo Div. Expands Truck Line With 10 Models in Two Series

Reo Div. of White Motor Co. expanded its truck line with 10 new models in two series in the 18,500 to 23,000 GVW class. The two series—C-200 and C-300—have 15,000-17,000 lb capacity rear axles which Reo says are "suited to a broader number of applications."

Reo is offering a choice of single-reduction, double-reduction or two-speed axles and of five Gold Comet engines for both series. Wheelbases range from 125 to 185 in. The C-203 and C-303 tractor models are rated for 30,000 to 38,000 GCW.

Reo says its new series are designed to make trips quicker and with less driver fatigue. Long front springs are designed to provide a smoother ride, according to Reo.

Ford's New Galaxie Series Is Year Ahead of Schedule

Ford Div's new Galaxie series goes on sale this month, a year ahead of schedule.

Production of the new series began at Ford Div. assembly plants Nov. 17. First public showing was at the Los Angeles and Detroit automobile shows.

Suggested list prices are $48 higher than comparable models in the Fairlane 500 series. The Galaxie comes in two- and four-door hardtop and sedan models, as well as a convertible and a retractable hardtop. Prices start at $2303 for the two-door, six-cylinder sedan.

The Galaxie was rushed through presumably to counter Chevrolet's move in broadening its Impala line for 1959, and thus give Ford a stronger entry at that end of the price scale. Ford's Fairlane 500 series has been selling at a good rate during 1958—about 30 per cent of all Ford sales—but Ford believes it can capture even more of the lucrative luxury class with its new entry.

Youngstown Launches 2-Year, $50 Million Building Program

The Youngstown Sheet & Tube Co. is beginning a two-year, $50 million improvement program for faster steel production, especially automotive steel.

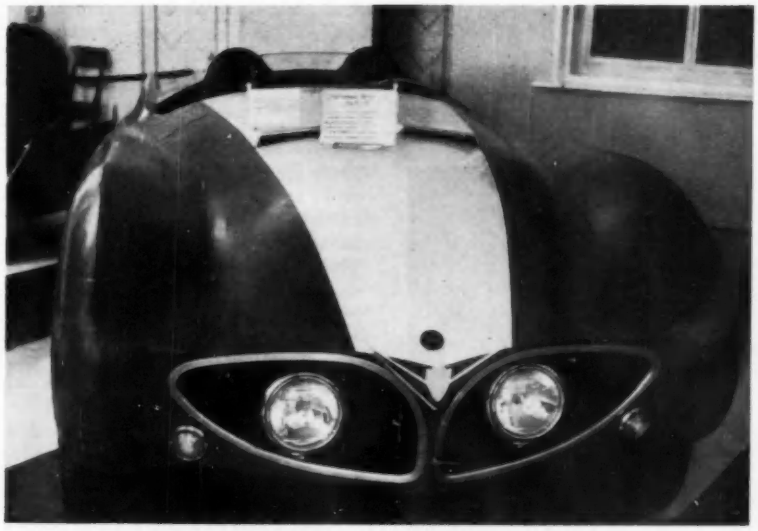
The program will include construction of five new buildings and revamping of the 79-in. hot-strip mill. Most of the mill's steel output has been going to General Motors, Ford and Chrysler.

Sheet and Tube's President A. S. Glossbrenner, said that during the improvement program, there will be no long shutdowns and no interruption of steel supplies to customers in the automobile industry.

The rolling speed of the finishing

STANDARD UNVEILS 1959 VANGUARD

Standard Vanguard for 1959, restyled by Michelotti of Italy, has deepened windshield and rear window, headlight cowls, new grille and taillight clusters, and spoked hub caps. Mechanical specifications of this model remain unchanged.



SOVIET ZIL GETS REINFORCED PLASTIC BODY

A production model of the Soviet Zil 112 with reinforced plastics body is on display at Agricultural and Industrial Exhibition, Moscow. Body was made by students in a Moscow technical school to show how plastics can be used for advanced styling.

section will be increased from 1450 to 2250 fpm. When the program is completed, the firm will be able to produce coils up to 40,000 lb each, a size customers are demanding. Present width of the 79-in steel will not be changed.

Three new slab-heating furnaces will be installed. Each will be capable of heating up to 200 tons of slabs hourly with five zones of heating control to assure quality heating. The new furnaces will be capable of heating slabs 26 ft long and 9½ in. thick. The largest slabs that can be heated now are 16½ ft by 4¾ in.

Ford Wind Tunnel Simulates Every Weather Condition

Ford's newest test facility, a wind tunnel called "Hurricane Road," is used to simulate nearly every type of weather condition that might be encountered in any part of the world.

The tunnel, completed recently at Ford's Dearborn Engineering Center, provides test engineers with wide ranges of temperature, wind velocity, humidity, rainfall, road speed and other variables.

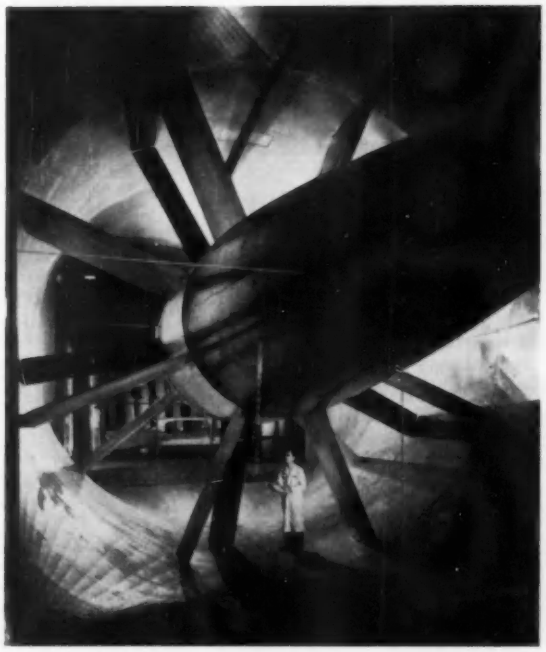
Winds roar up to 125 mph, with gusts to 140. Temperatures range from zero to 160 F. Relative humidity ranges from zero to 95 per cent. Rainfall can be varied from 0.5 in. to 4 in. per hour.

Sun load, emanating from 240 flush-mounted sun lamps, can be as high as 480 BTU's per hour for each exposed square foot of car. Road speeds can be adjusted by the tunnel's dynamometer system up to the maximum output for the test vehicle.

With all of this Ford engineers can put a test car through a quick series of weather changes ranging from mid-summer Death Valley to mid-winter Arctic conditions.

Winds are created by a five-blade propeller 24 ft. in diameter. The fan is synchronized with the dynamometer wheels so that air speed against the test vehicle will change with the car speed. The dynamometer also controls grade and load conditions, as well as vehicle speed.

Temperature can be dropped from 100 to 0 F in 30 minutes.



Cars are subjected to all kinds of weather and road conditions at Ford Motor Co.'s new test chamber at Dearborn, Mich. The new facility, known as "Hurricane Chamber," can produce winds up to 140 mph, temperatures from zero to 160 F, and humidities from zero to 95 per cent. A huge fan is synchronized to dynamometer wheels to match air speed with the road speed of the test vehicle. An overhead series of lamps simulates a "sun load" on test vehicles.

De Soto Adventurer Makes Bow At Detroit Automobile Show

De Soto's 1959 prestige model, the Adventurer, made its first appearance at the Detroit Automobile Show in November. The luxury series, now in its fourth year, is available in two models—a two-door hardtop and a convertible in either black or pearl white exterior finish.

De Soto, with the addition of the two Adventurer models, now lists 18 models for 1959. The Adventurer 383 cu in. engine is now available in all De Soto models.

A textured paint gives the roof of the hardtop model a simulated grain leather effect. Standard equipment includes swivel seats, power steering, power brakes, Torqueflite transmission, 14-in. white wall tires, and back-up lights.

Sales of $48 Billion Tallied By Retail Automobile Outlets

Sales of some $48 billion are being tallied this year by the nation's retail automobile outlets, according to a report from the Automobile Manufacturers Association. Included are sales of approximately $31 billion by motor vehicle dealers, $14.7 billion by gasoline stations and $2.3 billion by parts and accessories dealers.

NEWS AUTOMOTIVE AND AVIATION

STUDEBAKER TAXI POWERED BY NEW ENGINE

New Studebaker Econ-O-Miler taxicab is powered by a new 6-cylinder engine with a 169.6-cu in. displacement. Unit develops 90 bhp at 4000 rpm and 145 lb/ft of torque at 2000 rpm. Bore and stroke are 3.0 in. and 4.0 in., and compression ratio is 8.3 to 1. Vehicle is built on a 113-in. wheelbase and has overall length of 179 in.

Car Makers Go into High Gear To Make Up Lost Production

Automobile makers are ending 1958 with all stops pulled out to make up production lost during strikes.

Companies are paying overtime and second shift premiums to get out more cars, but many dealers still will not have a full floor of cars until after the first of the year. The full-speed pace, therefore, will continue well into 1959.

Passenger car production for 1958 will total about 4,280,000 units, providing there are no more work stoppages. By mid-November, production totaled 3,388,705 passenger cars and 729,481 trucks, according to the Automobile Manufacturers Association.

With Saturday work scheduled, there remained better than 30 full working days before year's end.

Edsel planned an 11.4 per cent production increase in November and a 38.5 per cent increase in December. American Motors slated its sixth production increase since the 1959 model run began. The latest boost brings the daily rate to 1280 units.

AMC, incidentally, set a production record of 25,124 cars during October, topping the former high of 25,893 cars built in March, 1955.

Pontiac began two-shift operations at all plants in November and added 1500 production workers.

Chevrolet aimed at capacity production by the end of November. This increase over the early November rate would give Chevrolet some 100,000 additional production before the end of the year.

Low dealer inventories aided the production outlook. As of Nov. 1, field stocks were approximately 260,000. In October, stocks were below 200,000.

Kaiser Presents New Design For All-Aluminum Small Car

Kaiser Aluminum & Chemical sales, Inc., is suggesting ways in which automobile stylists can use aluminum in both functional and decorative applications.

Kaiser is featuring a three-eighths scale model of an all-aluminum car named Pele in a presentation for stylists.

The Pele is aluminum from bumper to bumper.

Body panels are stamped aluminum with enameled finish. Doors are two-piece die cast aluminum with sculptured exterior. Aluminum bumpers incorporate rubber insert faces and parking "feelers." Aluminum engines, liquid and air-cooled, are of the flat or conventional type.

Kaiser also demonstrated a model of an American small car called the Menehune (see illustration).

A 112-in wheelbase design, this car features a pan-type frame and rear-mounted, air-cooled aluminum engine and transmission. The frame includes side sills, fender skirts, rear wheel housings, seat risers, and floor.

The engine and drive units become an integral assembly, removable for servicing by bolting the separate transmission and differential units to the crankcase.

Automobile Industry Spent $646 Million on New Plants

The motor vehicle industry, paced by the Big Three, spent some $646 million during 1958 on new plants and plant equipment, the lowest total since 1950.

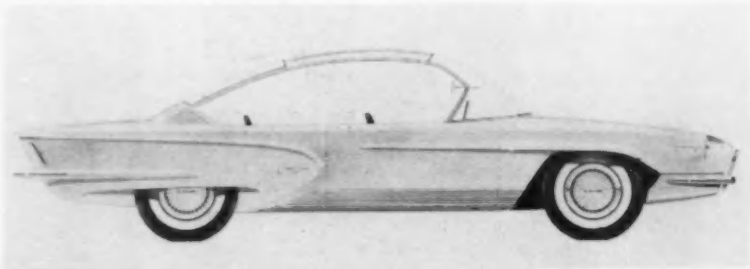
The figure is a sharp drop from the $1058 million paid out last year and the record $1689 million spent in 1956.

There is some encouragement though in the quarterly figures which show a definite upward trend.

Expenditures rose from $143 million in the first period to $155 million, $171 million and $177 million. If this trend continues through 1959, the total for the coming year would be up considerably.

None of the companies so far has announced any major new building projects for 1959, so it is difficult to predict just how high spending will go.

Chrysler spent about $85 million, with a large percentage going for construction of the St. Louis assembly plant. Other major projects which



The Menehune is Kaiser's new design approach to an American small car

took heavy capital included the Trenton engine plant, Trinsburg stamping plant, Delaware and Imperial assembly plants, and six new training centers.

Ford is spending $270 million over the two-year period of 1958-59, although most of this allotment already has been spent during 1958. Included in this year's budget were completion of the Sheffield aluminum castings plant, Dearborn engineering center, Sharonville transmission plant, Lorraine assembly plant, and additions at the Atlanta and Chicago assembly plants.

General Motors spent an estimated $300 million during 1958, probably will spend about as much next year. Major projects in 1958 included Willow Run truck, Fisher Body Mansfield, Chevrolet Massena aluminum foundry, and expansions at Atlanta, Chicago and Janesville.

In 1959, Chrysler's big project is completion of the St. Louis plant, plus modernization of other facilities. Ford's plans for the coming year center around modernization programs, plus a revamping of the Highland Park facility.

GM has announced no new groundbreakings for the coming year, although several projects could be in the works but under wraps for the time being. Still to be equipped are the Massena foundry and the Willow Run plant.

Ford Developing Fuel Cell, But No Application in Sight

Scientists at Ford Motor Company say the idea of powering an automobile with a fuel cell is theoretically possible.

But, at the moment, fuel cells offer promise only in a general way, Ford says, and there are no specific end products in view.

The major problems in using a chemical fuel cell for motor vehicles are in size and weight of the fuel storage tank, which might make the scheme prohibitive.

Another important factor is the conversion of electrical energy into mechanical energy to drive the wheels. Current electric motors are not competitive in size and weight with automotive internal combustion engines, according to Ford.

Ford also pointed out that high operating temperatures of fuel cells so far have posed tricky problems in vehicle operation.

Ford was commenting on a recent announcement by an aircraft company that a highly efficient fuel cell has been developed which could lead to large-scale application in transportation within five to ten years.

AI TABLOID

A "one-shot" method for producing polyether foam cushioning material that eliminates much of the premixing of other methods and simplifies curing has been developed by Mobay Chemical Co. A new combination of catalysts speeds up the foam production cycle and, at the same time, controls the rate of chemical reaction during the foaming step.

* * *

Chemists at Chrysler Corp.'s Engineering Div. are probing the role of oil additives in reducing engine wear through the use of radioactive atoms of sulfur and phosphorus as well as with a laboratory-scale tappet tester, which permits much closer control of test conditions than other methods for rating additives. A quarter of a V-8 engine camshaft and four tappets are run in the tappet tester which reproduces a wide range of engine speeds up to 3500 rpm.

* * *

A series of Russian articles on experiments in machine translation of languages has been published in English by the Foreign Technical Information Center of the Dept. of Commerce. Copies of "Experiments in Machine Translation" (PB 141383T, price $2), may be ordered from Office of Technical Services, Dept. of Commerce, Washington, D. C.

* * *

Car manufacturers are using about 250 different parts made of Du Pont's Zytel nylon resin in their 1959 models—a hundredfold increase in ten years' time. Current applications, Du Pont said, range from nylon dome lamp lenses to bushings used for Chrysler's new swivel seats, pouches of nylon film in Cadillac's new suspension system, and new window regulator rollers used by Ford.

* * *

Avco Corp. scientists have developed an electronic loudspeaker device called an Acoustic Noise Generator to study the effect of sound on delicate missile components. The generator can produce more than 163 decibles — comparable to a million automobile horns at a distance of 20 ft—to simulate rocket engine noise and sound waves encountered when a missile re-enters the atmosphere.

Using a new concept of cryogenic insulation, Linde Co. has come up with a series of super insulations that it says is up to 26 times more efficient than standard vacuum insulations. Tanks with the new insulation, designed to store liquid hydrogen, oxygen, and nitrogen, will have an evaporation rate of as little as 2.6 per cent of capacity per year, according to Linde.

* * *

Eastman Chemical Products, Inc., is marketing a new adhesive that it says can bind any two materials together. One drop of the new glue, according to Eastman, can bind a pair of metals weighing several hundreds of pounds apiece. Cost: $75 a pound, $10 for one ounce.

* * *

General Electric Co. developed a quartz thread that can be woven into cloth and used to reinforce plastics. The thread is composed of continuous fused quartz fibers about 0.0005-in. in diameter. Tests show that a quartz-reinforced plastic can withstand temperatures greater than 5000 F, according to GE.

* * *

Texas Co. scientists report they have succeeded in removing so-called normal paraffins from antiknock gasolines by a new process called "Texaco Selective Finishing." The new technique involves use of a Molecular Sieve, which separates the tiny molecules of normal paraffins from the larger molecules, leaving a higher octane fuel.

* * *

U. S. motor vehicle manufacturers spent $5 million in the past five years to find an answer to the problem of engine exhaust gases and air pollution, according to Harry A. Williams, managing director of the Automobile Manufacturers Association.

* * *

Private industry spent about $2 billion in 1956 for applied research and development on aircraft and missile products, according to a National Science Foundation survey. This was 30 per cent of the total of $6.2 billion spent for all industrial research and development, the survey said.

AVIATION MANUFACTURING

VISCOUNTS ON FINAL ASSEMBLY LINE

One of three Viscount final assembly lines at Hurn Airport near Bournemouth, England, where the V.700 series is built. Most of the V.800's are built in Weybridge where total production is currently running at an annual rate of 114. More than 400 of these turboprop airliners have now been sold to 40 different operators, including six in the U.S.

Pratt & Whitney Awarded Rocket Engine Contract

The Air Force awarded Pratt & Whitney Div., United Aircraft Corp., a design and development contract for an upper stage rocket engine that could be used to put a satellite weighing several thousand pounds into orbit.

The contract, which amounts to $9 million initially, is estimated to involve $23 million for the complete development.

The rocket will be liquid-fueled and of the high energy type and is to be used in conjunction with an Atlas-type first stage vehicle. The power of the engine was not disclosed.

Work on the engine will be done at Pratt & Whitney's Connecticut facilities and at its new Florida research and development center.

New Aircraft Lighting System May Prevent Mid-Air Collision

A new aircraft lighting system that will help prevent mid-air collisions has been demonstrated by Minneapolis-Honeywell Regulator Co.

The new M-H system enables pilots to determine "altitude" and approximate angle of other planes accurately enough to give adequate warning for a change of course. It is useful in daytime as well as at night, M-H officials said.

The system uses brightly flashing strobe lights of the kind used by photographers. Lights flash to the front, the sides, and the rear of an aircraft in three different frequency patterns—160 flashes per minute to the front; 80 to the sides; and 40 to the rear.

This pattern, M-H officials said, tells another pilot whether a ship is "coming, going, or paralleling him," often before he sees the aircraft itself.

For test purposes lights are mounted in small pods on the wing tips. This is adequate for slower aircraft, the company said, but jet transports and military craft should have beacons mounted flush in wing tips. Other special mountings would have to be devised for certain military aircraft, the company added.

Piper Aircraft to Market New Four-Place Airplane

Piper Aircraft Corp announced it is marketing a new four-place airplane called the Caribbean, which will sell for $8395. First deliveries are scheduled for mid-December.

The Caribbean, a low-cost version of the Piper PA-22, is powered with a Lycoming 0-320 150-hp engine. It has a cruising speed of 132 mph at 75 per cent power at 7000 ft. Gross weight is 2000 lb, empty weight 1100 lb, and payload 900 lb.

A de luxe version of the Caribbean, priced at $9350, is also available, the company said.

Cessna Unveils New Model 172 As Sales and Earnings Soar

Cessna Aircraft Co. unveiled its new 1959 Model 172 last month at Cessna dealerships throughout the U. S. and Canada.

Cessna said the all-metal 172 has a new instrument panel, new functional cowling design and completely new styling inside and out.

Meanwhile, the company estimated its sales for fiscal 1958 at $86 million, a 23 per cent increase over $70,049,000 in 1957 and an all-time record.

Cessna 172 has been restyled inside and out

Earnings are estimated at $6.15 per share, compared with $5.04 in 1957, also a record.

Dwane L. Wallace, Cessna president, said the sales gains were due to an increase in both commercial and military business. "Commercial aircraft sales showed a $5.6 million rise over 1957 sales of $32,628,478. Military business was up from $32,476,276 last year to about $41.9 million in 1958," he added.

Douglas Gets Navy Contract For $79 Million for Skyhawk

Douglas Aircraft Co. has received a Navy contract for over $79 million for production of A4D-2N Skyhawk planes.

The contract is for the third version of the Navy's lightest jet night attack plane. Advanced features of the latest model, the Navy said, are improved weather and navigation capabilities, and in-flight fueling.

The new Skyhawk is powered by a single Wright J-65 Sapphire turbojet engine and has the same basic configuration as the first two models of the series. Both Navy and Marine units will use the craft.

New Motor Operates Red Hot With Inorganic Insulation

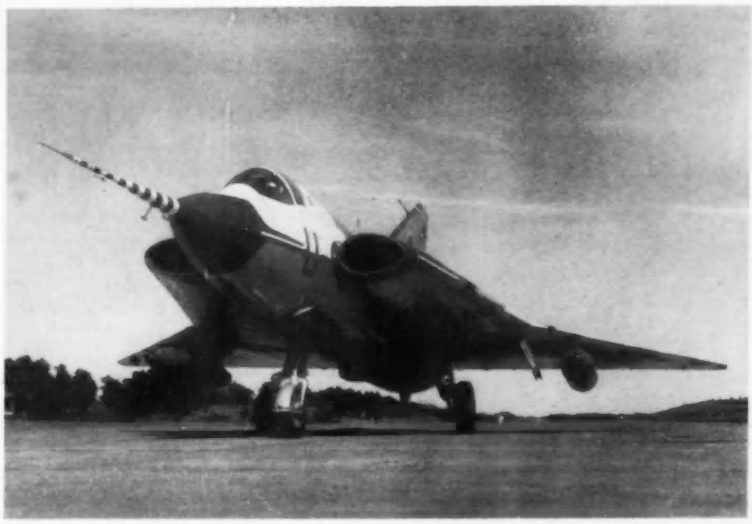
A new electric motor that operates red hot at temperatures of 1000 F or more has been developed by Westinghouse Electric Corp.

The motor is designed to test a new kind of insulation also developed by Westinghouse scientists that may find use in electrical equipment for jet planes, rockets, and missiles.

The new insulation is made entirely of inorganic materials flexible enough to be placed around an electrical conductor, according to Dr. E. J. Croop, manager of insulation and chemical development in the materials engineering department.

In addition to the insulation, Dr. Croop reported, the experimental motor uses silver windings and special high-temperature bearings.

The new inorganic materials have been used experimentally in insulated wire, flexible sheet insulation, and laminated materials, but there are still problems to be solved before they can be put to practical use, Dr. Croop noted.



SAAB-35A SOON TO GO IN SERVICE

The new Saab-35A Draken jet fighter will go in service with the Swedish Air Force within the next year. The single-seat supersonic plane is powered by a Rolls-Royce Avon engine and a new afterburner built by Svenska Flygmotor AB. The first production model shown here has two air-to-air rocket pods underneath the wings.

New Westinghouse insulation enables this experimental electric motor to work efficiently at this grinding job while it is exposed to searing heat from jets of burning gas. Motor operated continuously for more than 100 hours in an oven at 950 F with no apparent damage to the insulation, company reported.

North American Reports Lower Sales and Earnings

North American Aviation's sales for the fiscal year ended Sept 30, 1958, totaled $904,038,848, and net income was $26,786,294, the company reported.

This compared with $1,243,767,483 sales and net income of $33,864,462 in 1957.

The backlog of unfilled orders at Sept. 30, 1958, the report said, amounted to $513 million, with an estimated $661 million in orders currently being negotiated as continuations of authorized programs.

For the fourth quarter of fiscal 1958, total sales amounted to $230,557,192, compared with $309,539,607 for the like period last year. Net income was $8,563,294, compared with $7,260,462 in 1957.

Kettering Dies at 82; Developed Self-Starter

As we went to press, word was received of the death of Charles F. Kettering.

Death occurred at his Dayton, O., home Nov. 25, after Mr. Kettering suffered a second stroke. He was 82.

Kettering developed the automobile self-starter and many other devices that won him world-wide fame. He was formerly in charge of the General Motors Research Laboratories.

MEN IN THE NEWS

National Screw & Mfg. Co.—E. L. Kauffman is now general manager of Chester Hoist Div.

United States Rubber Co., Tires Div.—W. E. Crouch was named manager of automotive and allied products department.

Enjay Co., Inc. — John E. Wood, III., was elected president.

Joseph T. Ryerson & Son, Inc.—**Keith J. Evans** retired as marketing and public relations consultant.

ACF Industries, Inc., Avion Div.—**Frank J. Spayth, Jr.,** was appointed manager of the Data Processing Dept.

Dow Chemical Co. — **James W. Harris** has been appointed assistant to the sales manager of the Chemicals Dept., and **Earl H. Farnham** was named manager of organic chemical intermediates, succeeding Harris.

Westinghouse Electric Corp. — **Bruce D. Henderson** has been appointed to the executive vice-president's staff, and Raymond K. Serfass succeeds him as manager of the air conditioning division.

American Sealants Co.—**Robert E. Caroll, Jr.,** was named manager of market development.

General Motors Corp., AC Spark Plug Div.—**George U. Matthews** has been appointed regional manager at San Francisco and **Alfred C. Conte** succeeds him as regional manager at New York City.

Lipe-Rollway Corp.—**John D. Williams** was elected president, succeeding **H. Follet Hodgkins,** who becomes chairman of the board. **Robert M. Zimmerman** was made vice-president, and **H. Follett Hodgkins, Jr.,** vice-president of Rollway Bearing Co., Inc., a subsidiary.

Youngstown Sheet and Tube Co.—**Walter E. Watson,** vice-chairman, has retired.

Cadillac Motor Car Div., General Motors Corp.—**W. T. LaRue** has been promoted to assistant general sales manager for the western half of the U. S., succeeding E. F. Upson, retired.

Brown & Sharpe Manufacturing Co.—**Herbert H. Upton** and **Thomas Hollis, Jr.,** were elected vice-presidents.

Ainsworth-Precision Castings Co.—**George M. Rice** was appointed automotive sales manager and **Daniel R. Simmons** director of purchases.

Walker Manufacturing Co.—**Robert K. Ruland** has been appointed vice-president and manager of original equipment sales.

Solventol Chemical Products, Inc.—**Carleton A. German** was promoted to industrial sales manager.

Chrysler Corp., Airtemp Div.—**Marvin A. Smith** has been named director of production programming and procurement.

George L. Nankervis Co.—**Kenneth R. Waltz** was named chief engineer.

U. S. Rubber Co.—**Wilbur E. Combs** has been appointed manager of development for the mechanical goods division.

Dow Chemical Co. — **Herbert H. Lyon** was promoted to manager of the Madison Div.

Hannifin Co.—**Thomas H. Thoresen** has been appointed field sales manager.

Chrysler Corp.—**Floyd Dugan** was named director of sales planning and **Thomas A. Ostby** director of distribution and scheduling.

Hiller Aircraft Corp. — **Captain Sydney Sherby, U.S.N.,** has been appointed vice-president of engineering and research.

Buhr Machine Tool Co.—**Edward A. Farwig** has become manager of proposals, pricing, and orders.

Veeder-Root Inc. — **Harvey L. Spaunburg** was elected chairman of the board and **Wilbur C. Stauble** president.

Solar Aircraft Co.—**Armin F. Raebel** was promoted to chief experimental engineer.

Studebaker-Packard Corp. — **A. J. Kinnume** was made sales promotion manager of the parts and service division and Howard Holmes will succeed him as product development supervisor.

Arvey Corp. — **Milton B. Hesslein** was elected vice-president of the corporation and manager of the Detroit Div.

Chrysler Corp.—**Robert C. Mitchell** was elected secretary of Chrysler International, S.A.

American Bosch Arma Corp., American Bosch Div.—**Louis Nagy** has been appointed staff assistant to the general sales manager.

F. Jos. Lamb Co.—**Joseph R. Wrobel** has been appointed sales manager.

Gregory Industries, Inc.—**Leonard C. Barr** was elected executive vice-president.

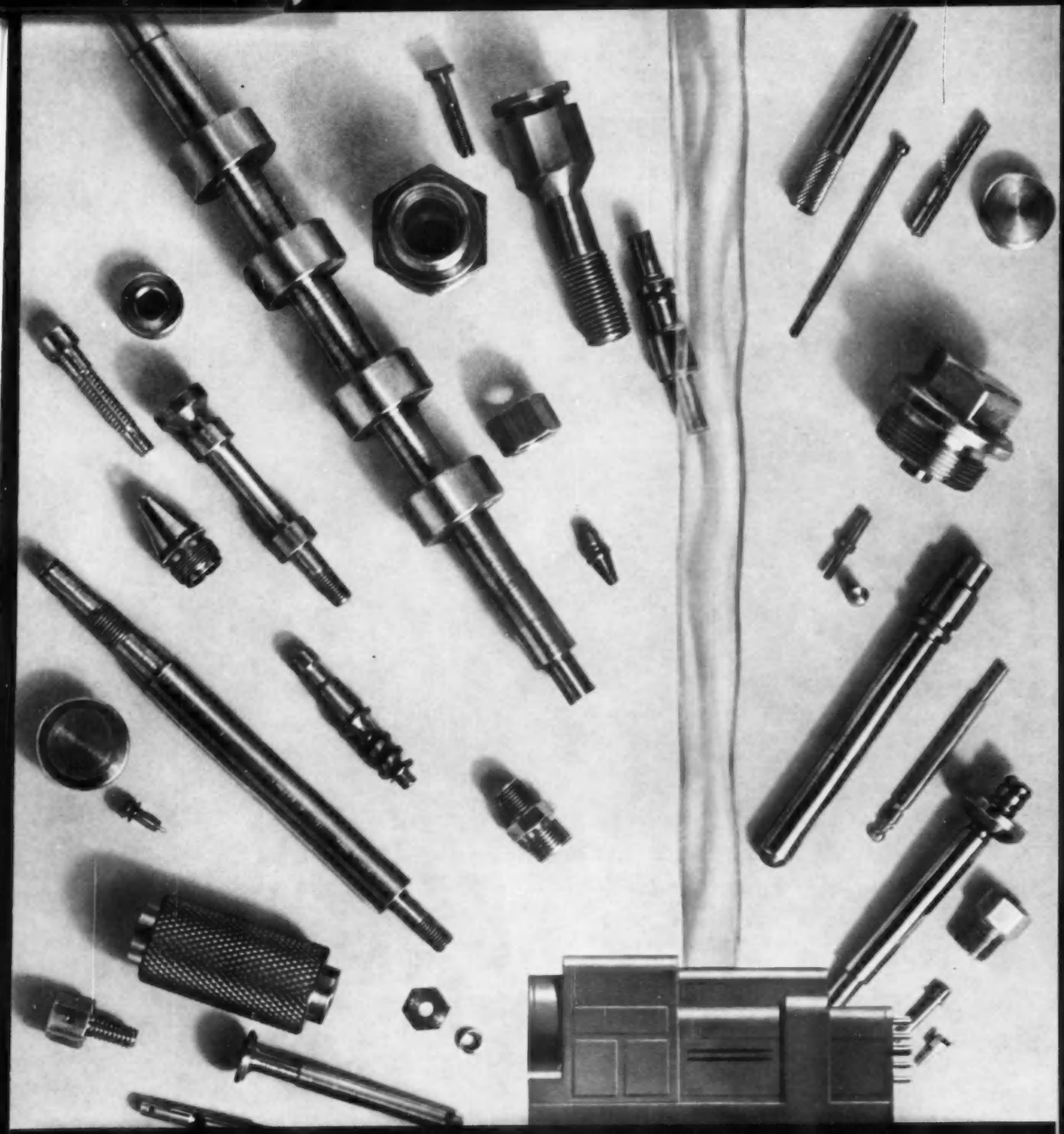
Houdaille Industries Inc.—**Robert J. Hummel** has been elected a vice-president.

Ramsey Corp.—**Kenneth T. Walden** was made head of the Retaining Ring Div.

(*Turn to page 29, please*)

ACF Industries, Inc., Carter Carburetor Div. —Gene P. Robers was appointed vice-president of after-market sales.

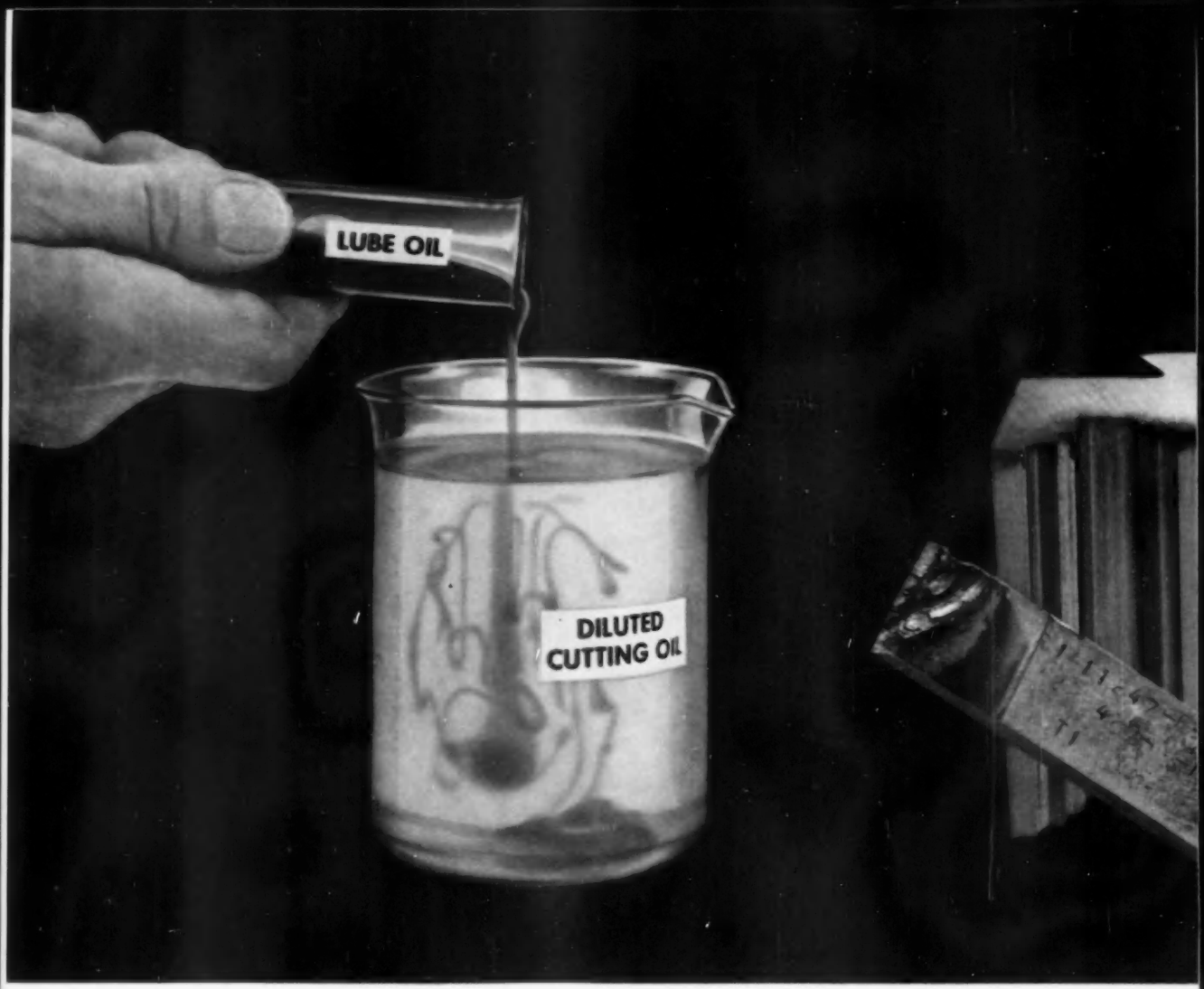
Ford Motor Co. — Philip H. Pretz was appointed director of the Testing Operations Office, Engineering and Research Staff.



1/3 MORE PRODUCTION FROM 7 OUT OF 10 AUTOMATICS

with

the Texaco Cleartex Cure



3 TO 8 GALLONS OF LUBE OIL PER SHIFT leak into the cutting oil sump on 7 out of 10 automatics now operating. This cumulative reduction of cutting oil efficiency is actually to blame for many screw machine problems.

SHORT TOOL LIFE due to chip weld, cratering, burning, can often be traced directly to lube oil dilution of cutting oil effectiveness. Your

Diluted cutting oil causes costly troubles in automatic screw machines . . . short tool life . . . frequent downtime. Diluted cutting oil can be cured . . . forever! Prove it yourself . . . Start the Texaco

saving in tool regrinds, tool replacement and downtime offsets the price of premium Cleartex many times over.

A CRITICAL SYMPTOM of cutting oil dilution in your automatic screw machines is excessive scrap production. Another, and earlier one to watch for, is frequent need to refill lubricating oil sumps.

HERE'S HOW: First, call in a Texaco Lubrication Engineer. Let him survey your automatic set-up—metals being machined, operating conditions, etc. Then, if your automatic screw machines are of the vast majority that can benefit from the Texaco Cleartex Cure, use a Cleartex Oil for *both* cutting and lubricating in just one machine as a test. On 70% of automatics in use today, men in charge of production and maintenance run into recurring troubles that they can actually cure with this one decision.

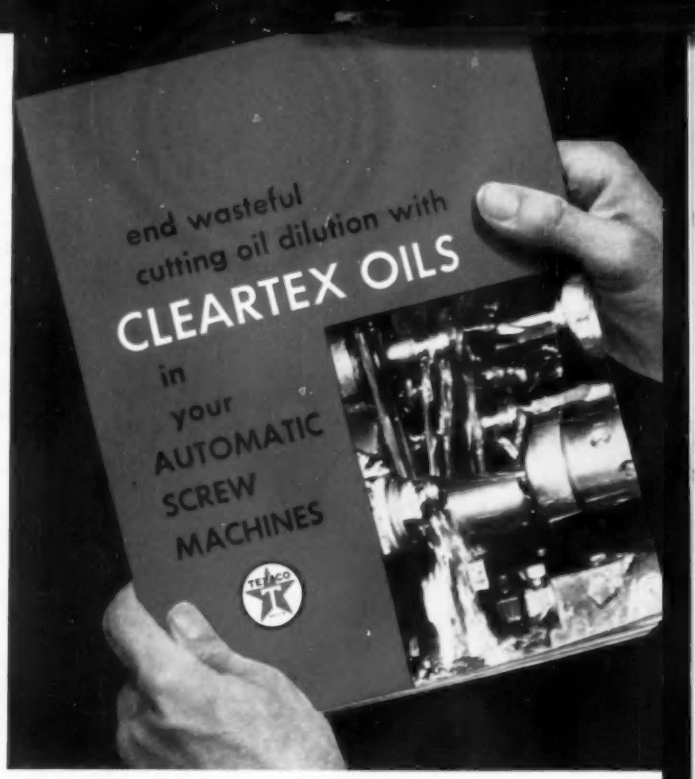
Cleartex Cure

TURN PAGE FOR DETAILS OF METHOD

TEXACO

SEND FOR THIS NEW TEXACO BOOK NOW!

To do your job . . . stop waste and boost output . . . compete better on quality . . . you need to know what Cleartex Oils can do in automatic screw machines. This book spells it out.



See for yourself how Cleartex helps you reduce operating costs

How Cutting Oil Is Diluted

When lubricating and hydraulic oils leak into the cutting oil sump, the cutting oil is diluted. It loses strength; ingredients that make it an efficient cutting oil become less and less effective. This happens more frequently than is realized.

One way to make a quick check is to keep a record of how much lubricating oil (or hydraulic fluid) is being added to a machine. Lube oil make-up is a good measure of dilution on the cutting oil side and a sign that tool life and production is probably being lost.

Cleartex Cures the Problem

Texaco Cleartex Oils were developed to cure this problem forever.

The Cleartex Series are transparent, non-corrosive products. Despite their non-corrosive features, they do have relatively high extreme pressure properties, which make them well suited as general purpose cutting oils for use in a wide variety of operations where requirements are normal.

On non-ferrous metals, they are particularly effective because they are non-corrosive.

They are also excellent as machine tool lubricants and hydraulic fluids, principally because of their exceptional chemical stability, load carrying ability and rust preventing properties. Thus, they are truly efficient dual or tri-purpose oils. In addition, Cleartex Oils have excellent odor, color, E.P. properties, corrosion protection.

How to Set Up a Test

Cleartex Oils are demonstrably superior to any dual or tri-purpose lubricants available today. It also seems apparent that the cost of operating 70% of the automatic screw machines can be reduced by the use of a Cleartex Oil. We say this because on automatic screw machines that now use the new Texaco Cleartex Oils for cutting, lubricating, and (if needed) hydraulic fluid, difficulties of short tool life, rejects and downtime have been cured, or definitely reduced.

Why don't you arrange with a Texaco Engineer to make a test on one machine—or on an entire line if you want to go for the savings immediately. Contact any one of Texaco's 2,000 Distributing Plants in the 48 States, or write to The Texas Company, 135 East 42nd Street, New York 17, N. Y.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

MEN IN THE NEWS

(*Continued from page 24*)

Cincinnati Milling Machine Co.—Walter W. Tangeman (left) retired as chairman of the board; Frederick V. Geier (far right) was elected chairman and chief executive officer; and Swan E. Bergstrom (center) succeeds Geier as president.

Thompson Ramo Wooldridge Inc., Thompson Products Div.—**M. S. Griffin** was named staff director of advertising.

Ford Motor Co., Tractor and Implement Div.—**F. A. Wagoner** was appointed manager, Plant Engineering Dept., Highland Park (Mich.) Tractor Plant.

Cadillac Motor Div., General Motors Corp.—**J. P. Schaupner, Jr.**, has become merchandising manager.

Ford Motor Co.—**A. H. Esper** has been appointed executive engineer in charge of all proving ground operations.

White Motor Co., Reo Div.—**Robert Montague** was made superintendent of inspection and quality control.

Gear Grinding Machine Co.—**Fred F. Miller** was promoted to vice-president in charge of engineering.

Bendix Aviation Corp., Bendix Products Div.—**Lawrence W. Fischer** has been made an executive sales engineer on the automotive general sales staff.

Chrysler Corp.—**R. L. Biggers** was appointed director of Government and military automotive product sales; **N. W. Seidel**, director of fleet sales; **M. L. Van Dagens**, director of sales training; and **L. W. Piot**, manager, MoPar Dealer sales.

Hercules Motors Corp.—**Robert J. Niehaus** has been appointed general purchasing agent.

Hancock Industries, Inc.—O. L. Wigton has been named vice-president, marketing.

Chevrolet Motor Div., General Motors Corp.—**Charles J. French** was named head of the dealer relations department.

B. F. Goodrich Canada Ltd.—**Ira G. Needles** was elected chairman of the board, and **Robert V. Yohe**, president and chief executive officer.

Minneapolis-Honeywell Regulator Co., Brown Instruments Div.—Warren W. Lee has been appointed eastern region sales supervisor for systems engineering.

Alan Wood Steel Co.—**James F. McCrudden, Jr.** has been appointed district sales manager in charge of the New York office.

Heppenstall Co.—**Robert B. Heppenstall, Jr.**, was elected a vice-president.

Bunting Brass & Bronze Co.—**Raymond O. Oyler** has become director of sales.

Necrology

Victor F. Stine, 65, president of Pangborn Corp., died Oct. 29.

Francis J. Baritot, 52, traffic manager at the Ford Motor Co. assembly plant in Lorain, O., died Oct. 29.

Robert W. Appleton, 75, former director of purchasing of the old Pierce-Arrow Motor Co., died Oct. 25, at Hollywood, Calif.

IN FASTENERS SOUTHERN IS

plated

For plated screws that assure corrosion resistance and beauty, you can rely on Southern's better finishes in plated nickel, zinc, cadmium, brass, copper, statuary bronze, blued or black oxidized screws. All of these are finished in our own plant to rigid specifications. Chromium plated brass wood screws, machine screws and nuts, and hot galvanized steel wood screws are stocked in all popular sizes.

Southern's cadmium and zinc plated fasteners are treated for extra brightness and corrosion resistance with IRIDITE® chromate conversion coating. This also makes the screws suitable for painting without additional treatment.

Try Southern's quality plated screws. There are no better available—anywhere. Send your order or inquiry to Southern Screw Company, P. O. Box 1360, Statesville, North Carolina.

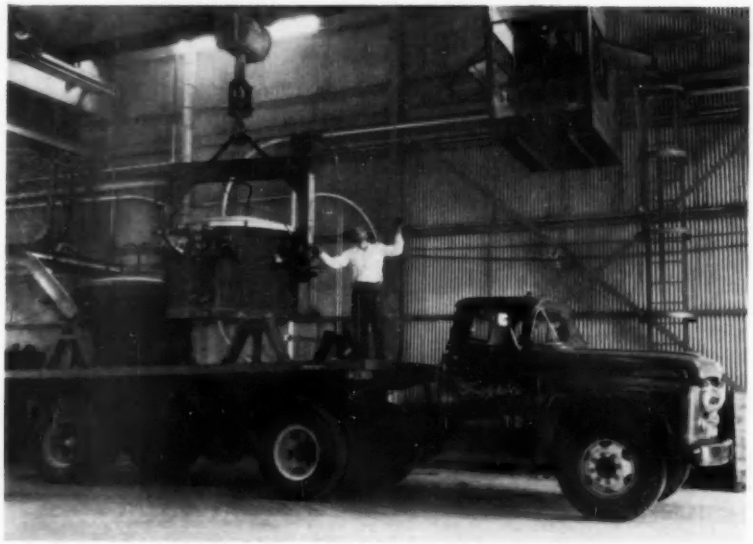
Machine Screws & Nuts • Wood Screws
Hanger Bolts • Tapping Screws • Wood Drive Screws • Carriage Bolts

Warehouses: New York • Chicago • Dallas • Los Angeles

Southern SCREW COMPANY
STATESVILLE • NORTH CAROLINA

Circle 236 on Inquiry Card for more data

Molten Metal Delivered to Ford Aluminum Foundry



Two 5000 lb capacity crucibles of molten aluminum are loaded on a Ford Motor Company truck in the Reynolds Metals Co. Listerhill Reduction Plant. The molten metal is carried to the nearby Ford Sheffield plant.

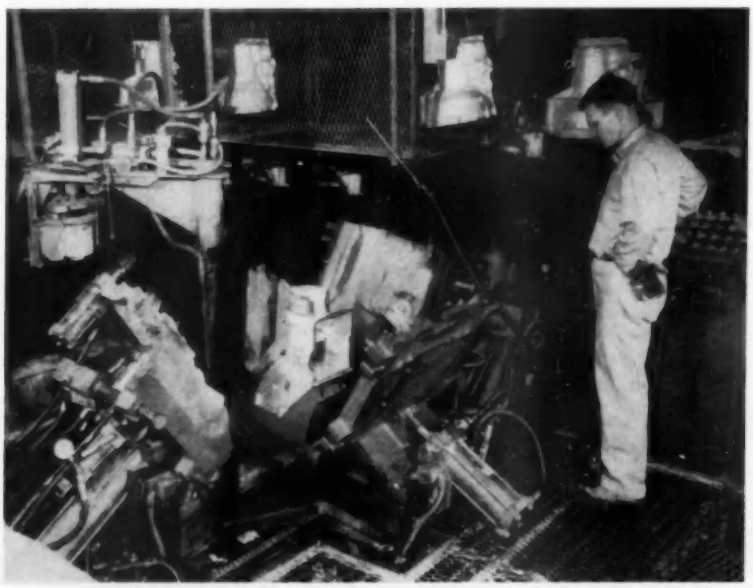
AUTOMOTIVE history was made late in October with the first public viewing of an "integrated" aluminum foundry operation. The event was a press tour of the new Ford Motor Co. aluminum foundry in Sheffield, Alabama, which is served by the nearby Reynolds Metals aluminum reduction plant. As will be described later, the metals plant produces aluminum alloy from alumina, delivering the metal in its molten state in huge pots directly to holding furnaces located in the Ford plant.

This arrangement has many important economic advantages. In the first place it provides an unfailing source of aluminum alloy in accordance with requirements. Because of the proximity of both plants, molten metal is delivered by truck without much loss in temperature, thereby eliminating the usual stages of preparing pig, shipping the pig to its destination, and the subsequent remelting of pig. It eliminates many facilities and services in each plant, reduces the amount of equipment required thereby, and saves considerable cost in electric power.

In his address to a selected group of editors, C. H. Patterson, Ford vice-president power-train group, mentioned that the 1959 Ford Fairlane 500 with a V-8 engine contains 68 lb of aluminum; the Edsel has 57 lb; a typical Mercury, 53 lb; while the four-door Lincoln Premiere contains 84 lb. He predicted that within five years the average passenger car will contain from 100 to 120 lb of aluminum.

At the press conference Reynolds indicated that the number of functional applications of aluminum will amount to 344 in 1959 passenger cars. This important increase is attributed to the newer concept of designing specifically for aluminum rather than by following the obsolete approach of direct substitution for commonly-used materials. Reynolds estimates that, without taking into account some of the probable breakthroughs in the offing, the consumption of aluminum will more than triple within 10 years.

Reynolds is confident that by extending to other parts of the car the concept of automotive mass



One of the largest aluminum parts now being used in the automobile industry is the automatic transmission casing produced by Ford at its Sheffield, Ala., plant. The 24-lb cases are cast in complex, three-sided permanent molds.

production techniques already in use, it would be possible to produce right now an all-aluminum car.

The Ford aluminum castings plant is a modern one-story building with some 200,000 sq ft of floor space located on a 120-acre site just one-quarter of a mile away from the Reynolds reduction plant. It is now producing some 67 different engine and automatic transmission parts for the Ford family of cars, employing the latest techniques of die-casting and permanent mold castings.

Details of Operations

For capacity operations this plant will employ 800 people with an annual payroll of about $4-million. It will consume raw materials, supplies and services costing an additional $13-million yearly. Around 4-million cu ft of gas and 1,250,000 kw-hrs of electricity will be required monthly.

Molten aluminum, alloyed to Ford specifications with silicon, copper, and manganese is received from Reynolds on flat-bed Ford trucks over a connecting private road. Ten truck loads, each consisting of two, 500-lb ladles of molten material are delivered to the Ford plant during a 24-hour period, seven days a week.

Hot metal is received at the Ford plant at a temperature of about 1400 F, losing only about 100 F during the trip. Upon receipt at the Ford plant, the metal is transferred by overhead crane and a mechanized pouring spout to one of eight Lindberg industrial type holding furnaces, each one having a capacity of 65,000 lb. It is of interest that all rejects and trim from production are remelted at the Ford plant, using a group of six 20,000-lb Lindberg furnaces which also serve for holding metal before it is released for delivery to the die-casting and permanent mold equipment.

As requirements demand, the alloy in the large Lindberg furnaces is further alloyed with magnesium or iron. It is then refined by gaseous chlorine and transferred to 2000-lb ladles for delivery to the casting machines by overhead monorail cars. This metal is held at each station in small Lindberg-Fisher holding furnaces until required by the operator.

The die-casting departments are equipped with a battery of 400-ton Lester - Phoenix die - casting machines; and a battery of 800-ton Lake Erie as well as the latest type Lester - Phoenix die-casting machines. Each of these is served by a Lindberg-Fisher holding furnace. It is of interest too that all of the die-casting equipment is operated hydraulically, employing an approved type of water-soluble fire resistant hydraulic fluid.

At the present time the variety of pistons produced at Sheffield are made along four lines of equipment, each machine producing at the rates of two pistons per minute. As the pistons near the end of the line on the belt conveyors, they enter the Motch & Merryweather automatic milling machine, illustrated here. This removes the risers and gate on the two sides and top. From this point the pistons enter aging furnaces for stress relief. Pistons then are rough-turned on the skirt and dome in automatic Baird chucking machines and weighed to a stated rough-weight tolerance of 15-grams before acceptance.

The plant is producing nine different pistons at the present time, ranging in weight from 655 grams to 1017 grams.

Quality control is implicit in this operation through the medium of advanced laboratory facilities. The laboratory makes sampling tests of molten metal taken from the holding furnaces, as well as samples of cast sections. Dry analysis of metal is made rapidly in the automatically - operated Quantometer, an advanced form of spectrograph, employing an optics and electronic system. The laboratory also has complete wet chemistry facilities for quantitive analysis; a 175,000-kv X-Ray machine which can penetrate five inches of aluminum; and a physical testing section.

As mentioned earlier, the Sheffield plant is producing some 67 parts, ranging in weight from pieces of 0.053-lb to transmission housings of 24 lb. Among these parts are the nine different sizes of pistons, two different transmission cases, a variety of transmission extensions, the entire group of valve body components, automatic transmission stators, engine front covers, etc.

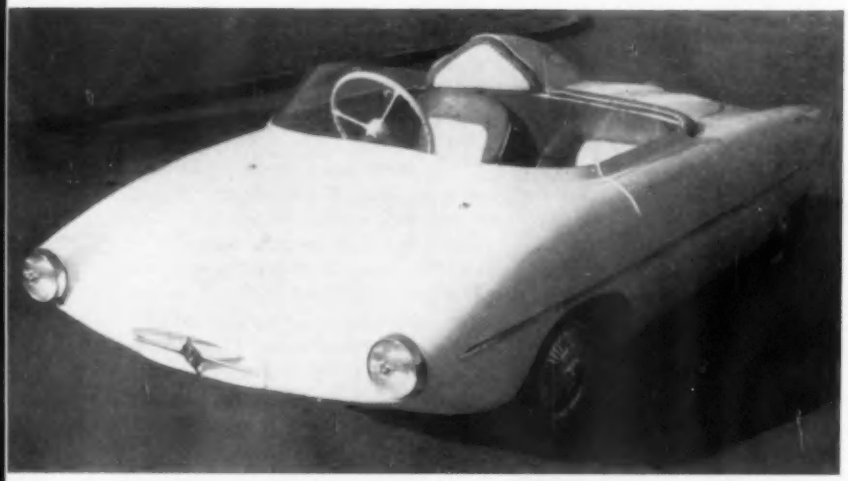
The Reynolds Listerhill complex serving the Ford plant, among other things, has two big reduction plants with an annual capacity of 190,000 tons of virgin aluminum. The new reduction plant, which began operation this year, represents an investment of some $70-million. A $65-million expansion now under way at the Alloy plant will feature the world's largest aluminum hot-rolling mill, headed by a 170-in.-wide breakdown mill.

The Ford-Reynolds contract calls for deliveries of 640-million pounds of aluminum over a 10-year period. A significant portion of the output of the Reynolds Alloys plant goes into automotive trim production in the form of blanks for grilles, headlamp and taillamp bezels, and interior and exterior trim items for various motor car producers.

The Reynolds reduction plants represent the most advanced practice known to the art. Raw materials consist of alumina, carbon, electric power from TVA, and cryolite. Alumina is produced from bauxite ore in Reynolds plants at Corpus Cristi, and in Arkansas, shipped by rail to the reduction plant.

The reduction process takes place in enormous batteries of electrolytic cells in which the pot is a rectangular iron shell, insulated and carefully lined with a rammed lining of carbon paste forming the cathode element of the cell. The anode, a big rectangular block dropped down into the bath, is solid near the bottom but topped with a green carbon paste which must be replenished constantly. The tub holds the molten cryolite and alumina.

Electric current, entering the cell via the anode, breaks down the oxygen and metallic aluminum from the alumina. Oxygen combines with the carbon to form a gas which is drawn off. Molten aluminum sinks to the bottom of the tub and is siphoned off periodically into one of the large vacuum crucibles, ready for delivery to the Ford plant. ■



Frisky Sprint, designed for competition work, has a rear-mounted 34-hp engine.

London Motor Show Reflects Boom in British Automobile Industry

LONDON, ENGLAND

By David Scott

Special European Correspondent for AUTOMOTIVE INDUSTRIES

THE 43rd International Motor Show at Earls Court, London, that closed on November 1, marked a bumper year in the fortunes of the British automobile industry. Car production is expected to exceed a million units for the first time in its history, and the average weekly output of 20,000 for the January-September period is nearly a third above the 1957 figure.

Exports are also booming. Overseas shipments, accounting for roughly half the total sales, are currently running at a record annual rate of 500,000 cars valued at $530 million. America has jumped far in the lead among the U.K.'s foreign customers, and the first nine months' sales reached 109,000 cars, 60 per cent higher than a year ago.

Canada has climbed to second place, and the British industry is heartened by the growing vogue for imported cars in North America, which now takes 28 per cent of their exports. There have also been substantial gains in South Africa, Australia, Eire and Venezuela.

At the same time, domestic sales are expanding rapidly following the relaxation of the credit squeeze and lowered bank rate, making it easier to buy cars on time.

In view of the bright commercial outlook, the major U.K. manufacturers are engaged in consolidation rather than departing from conventional, safe designs. For other reasons, too, there were few outstanding technical innovations to be seen at the show.

Two-pedal control (automatic clutch operation) has not caught on with the buying public; nor have automatic transmissions been widely accepted, largely because of their high basic cost inflated further by purchase tax (an automatic adds perhaps $500 to the retail price of a mass-produced car); while power steering and disk and power brakes are found only on the higher-priced models.

As a result, the main trends, evident at the show, are in the fields of higher engine power and improved body lines, with Italian stylists in the ascendency.

Having engaged Michelotti as a styling consultant, Standard produced the first results of his influence in the Vanguard Phase III. The minor facelift include a Latinized grille, length-stressing trim and neater taillight clusters. But aside from the new roof design

Rover "Three Liter" is of semi-frameless construction, with the engine, gearbox and front suspension assemblies mounted on a detachable subframe.

that deepens the front and rear glass areas and gives a lower overall line, all the existing body panels are retained. This model is regarded as a precursor of a completely new Standard sedan that will emerge when full retooling is felt to be justified.

Another instance of successful de-Anglicization is the Italian-styled Austin A40 that was unveiled at the Paris Motor show a few weeks earlier. Designed by Pinin Farina, it is a small four-passenger vehicle shaped like a station wagon, and has a half-height vertical trunk lid that is bottom-hinged to drop down like a tailgate.

With the rear seat in position, the 11½-cu ft luggage space is enclosed by a detachable panel at waistline level, but the cargo area can be nearly doubled by folding the rear seat forward. Most of the mechanical parts are interchangeable with those of the A35 sedan which continues in production.

Also first seen at Paris was the revived Humber Super Snipe with an entirely new six-cylinder 161.8-cu in. engine developing a maximum of 112 hp at 5000 rpm and a torque of 1660 lb/in. at 1600 rpm. Design features include inclined valves in near-hemispherical combustion chambers, a high-level camshaft with short pushrods, and flat-topped pistons. The camshaft runs in an oil bath and drives the distributor, oil pump and mechanical fuel pump.

In its new "Three Liter" model, Rover has combined modern styling with a number of unusual design details. It is of semi-frameless construction with all the main forward mechanical units carried on a detachable subframe fabricated from box-section members.

This assembly is joined to the unitary body shell by six Metalastik mountings. Similar bonded rubber blocks also support the engine and transmission, while rubber bushings are used on the inner ends of the upper suspension links and on the radius rods for effective sound deadening.

Swivel pins are attached by sealed ball joints, and the upper links are inclined rearwards at a 12-degree angle to minimize nose-dive on braking. Front springing is by laminated torsion bars, and the single lower suspension link pivots in rubber-bushed bearings.

The Rover is powered by an enlarged 183-cu in. 115-hp engine derived from the overhead-inlet side-exhaust valve units of the existing models that continue unchanged.

The Armstrong Siddeley Star

(*Turn to page* 72, *please*)

Armstrong Siddeley Star Sapphire has a new 165-hp engine with a Borg-Warner automatic transmission. Power steering and disk front brakes are standard.

Austin A40 has an extended roofline enclosing the trunk.

Standard Vanguard Phase III station wagon with styling improvements by Michelotti.

Liquid-Cooled Brakes for Retarding and Service Braking

By J. D. Dudley
WAGNER ELECTRIC CORP.

WAGNER realized the need to design a brake that could dissipate the heat under the severest conditions, meet the requirements to fit into a smaller wheel, be competitive in cost to a retarder plus a service brake, and be lighter than a conventional air brake with accessories.

To accomplish this it only seemed natural to follow the pattern that had been set by the use of disk brakes on high-speed aircraft—that is, to concentrate our research on developing a liquid-cooled disk brake for commercial vehicles.

Liquid-cooled disk brakes have now been under development at Wagner for about three years. We feel certain we have a brake that not only meets the requirements of heat rejection, but also can retard indefinitely without overheating and can make one stop after another continuously without fade.

Figure 1 shows a cross-section of the Wagner liquid-cooled brake. The cast aluminum caliper consists of the outer housing and the inner housing. The annular actuating piston is also aluminum and is sealed by the "O" ring piston seals. The lining disk is steel and has the lining bonded to both faces. The inner periphery is slotted to mate with the teeth on the driver. The lining disk anti-rattle ring is to prevent rattling between the lining disk and the driver.

The copper friction plates are riveted to outer housing and the copper carrier and sealed by the use of "O" rings. The brake has an automatic adjuster. This adjuster maintains a constant clearance between the copper wear surface and the lining by the brake return spring retained within the automatic adjusting sleeve that is pressed into the copper carrier. If the cup clearance is taken up before the lining and copper contact, the sleeve will slip in the copper carrier thereby compensating for wear.

The liquid can enter on either side of the brake, depending on the axle mounting, and flows through the coolant passages to the back side of the copper friction plates. It can also be noted in Fig. 1 that the brake is protected from road splash and dirt and has no running seals.

The brake is designed for air-over-hydraulic actuation using a power cluster with a ratio of 11:1. The wheel driver replaces the drum in the wheel and transmits the torque to the brake. Fig. 2 shows an exploded view of the brake looking from the wheel side.

The top view of Fig. 3 shows a schematic of the brake coolant system. The lower schematic in Fig. 3 shows the air system. The foot valve meters air to the disk brakes at a predetermined pressure for retarding the vehicle. When the pressure exceeds the preset pressure, the retarding valve opens and air is metered to the disk brakes and service brakes. The retarding valve can be put in operation or left out of the system by moving the selector valve located in the cab to retarding and service braking or service braking position.

In addition to the liquid-cooled disk brake development, Wagner has been testing a liquid-cooled propeller shaft brake, as shown in Fig. 4. Heat generated during stopping or retarding is removed by the liquid flowing between the brake and the radiator.

Fig. 5 shows an exploded view of the brake as would be seen looking from the front of the vehicle. The brake consists of a rotating copper drum pressed on an aluminum rotor. This unit is then mounted on the stationary part, which is the stator, that contains the mounting lugs for attaching to the truck cross member.

The scoop directs the coolant from the coolant inlet to the back side of the copper friction surface and to the outlet. The slotted ring is the torque plate which transmits motion from the prop shaft to the copper drum. The band with lining bonded on the inside is attached to the stator.

As the copper drum rotates with the prop shaft the coolant is pumped from the radiator through the brake and back to the radiator. The brake is applied when the band is wrapped around the copper drum by means of a cam connected to a power source or to the emergency hand lever. The cam also opens a butterfly valve located at the inlet to the brake, during brake application so that maximum flow takes place only while the brake is being applied. ■

The foregoing is an abstract of a paper presented by the author at the SAE National Transportation Meeting held in Baltimore, Md., Oct. 20-23.

Diversified Products Becomes Div. of Avery Corp.

Diversified Products Co. has merged with Arvey Corp. and will operate as a division of Arvey. Both firms have been suppliers of interior trim for the automobile industry, Arvey since 1925 and Diversified since 1934. Immediate plans call for consolidation of the research and engineering staffs.

W. H. Kinball, president of Diversified, continues as manager of that division and now is a vice-president of Arvey. R. S. Hartman continues as president of the parent firm.

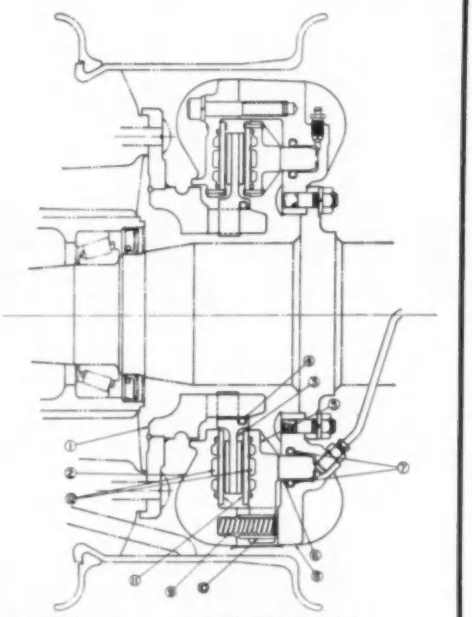


Fig. 1 — Cross-section of Wagner liquid-cooled disk brake

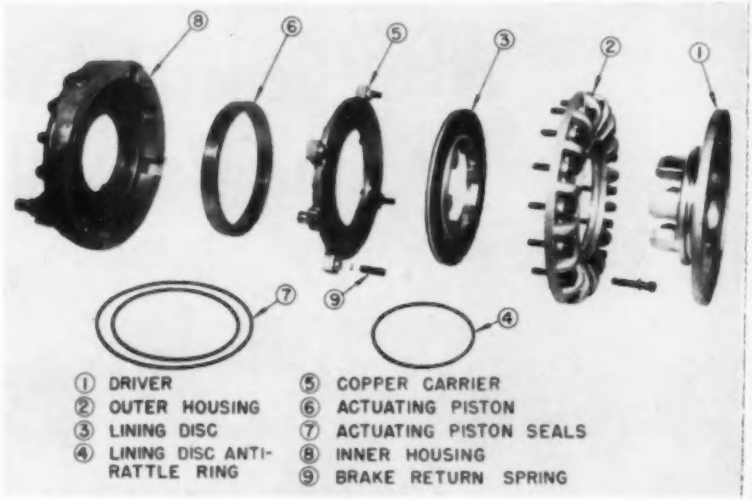


Fig. 2—Part lineup of Wagner brake as seen from wheel side

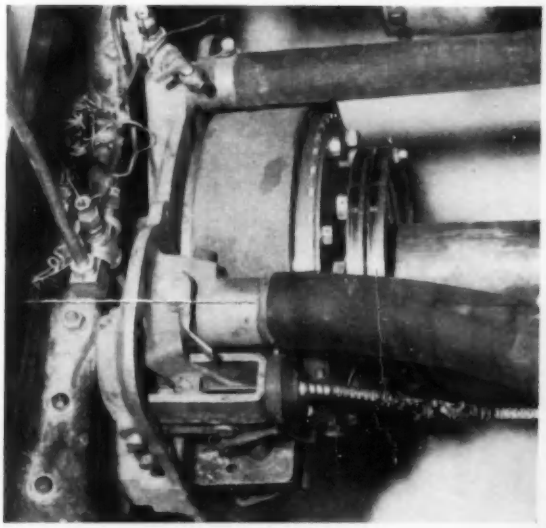


Fig. 4—Wagner liquid - cooled propeller shaft brake as installed

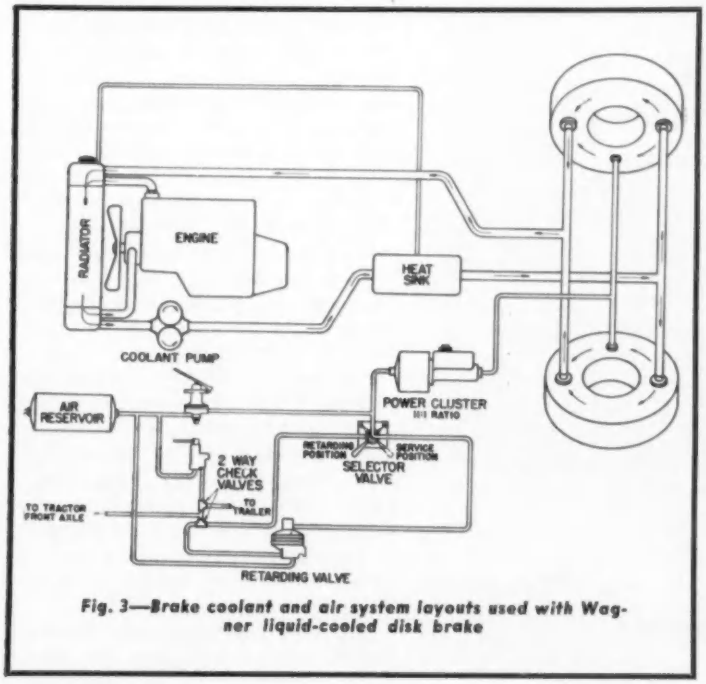


Fig. 3—Brake coolant and air system layouts used with Wagner liquid-cooled disk brake

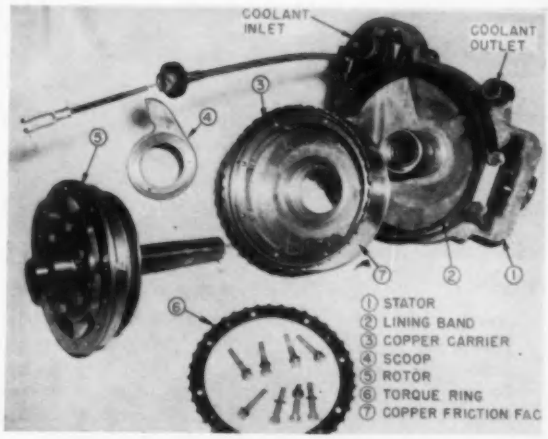


Fig. 5—Exploded view of propeller shaft brake

What General Aviation Means to the National Economy

By
David A. Partridge

PART I

FIG. 1—FOUR-PLACE PIPER TRI-PACER 160, EQUIPPED WITH ONE LYCOMING O-320-B ENGINE

Top Speed	141 mph	Gross Wt.	2000 lb
Cruising Speed (7000 ft, 75% power)	134 mph	Useful Load	890 lb
Stalling Speed (flaps down)	49 mph	Length	20.6 ft
Cruising Range (36 gal)	536 m	Approximate Cost	$9,000.00

FIG. 2—FOUR-FIVE PASSENGER CESSNA 310B, POWERED BY TWO 240 HP O-470-M CONTINENTAL ENGINES

Top Speed	232 mph	Gross Wt.	4700 lb
Cruising Speed	213 mph	Span	35 ft, 9 in
Service Ceiling	20,500 ft	Length	27 ft, 5 in
Cruising Range	975 m	Approximate Cost	$59,950.00

THE present fleet of general aviation type aircraft outnumbers the Nation's airline fleet by more than 40 to 1 and is being utilized at an annual rate fast approaching 11 million hours —a rate three times that of commercial airlines.

Sometimes overlooked by those not directly concerned, or perhaps shrouded by the fantastic achievments of military and commercial aviation, are the tremendous strides made by private, business and utility aircraft in recent years. This growth is by no means an accident, and could not have been possible without the careful planning and foresight of industry leaders. It is based on a sound, healthy foundation and, barring National emergencies, estimates indicate retail sales valued at one billion dollars in the next five years.

In order to consider the scope of the private, business and utility aircraft boom it is necessary to have some background or history on general aviation. It is the purpose of this article to provide that information and, also, to present an up-to-date picture as to what this phase of aviation has come to mean to the Nation's economy in terms of employment opportunities, material consumption, buying power, etc.

For many years this category of aircraft was looked upon, by the

FIG. 3—FOUR-PLACE BEECHCRAFT J35 BONANZA—HAS ONE 250 HP CONTINENTAL 10-470-C ENGINE

Top Speed (at sea level)	210 mph	Gross Wt.	2900 lb
Cruising Speed (2300 rpm)	180 mph	Useful Load	1080 lb
Stalling Speed (landing)	57 mph	Length	25 ft, 2 in
Cruising Range (55% power)	725 m on 35 gal	Height	6 ft, 6½ in
Rate of Climb	1250 fpm	Approximate cost	$24,300.00

general public, as offering little practical value. And yet, as far back as 1919, limited business usage and early experiments in crop dusting indicated a future potential for light aircraft far beyond that of providing thrills for patrons of country fairs.

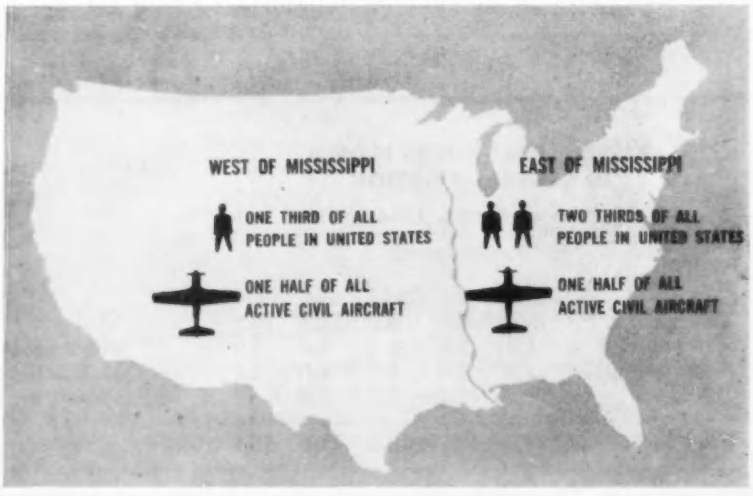
However, the first boom of general aviation did not arrive until after the Second World War when thousands of returning veterans, armed with the GI Bill, took to the air from hundreds of flying fields throughout the country. In 1946, to meet the demand sparked by the requirements of student pilots, America's light aircraft builders produced over 30,000 airplanes and, at the same time, the Government dumped hundreds of war-surplus ships on the market. The prime sales targets of aircraft distributors were not individual owners but operators of small airports who offered these planes for hire. And the great majority of light planes purchased at that time were single-engine, suited only for training purposes. It was soon apparent that most of these airplanes were unadaptable to the uses to which present day similar-type aircraft are applied. Also they were costly and difficult to maintain in many cases.

The surplus disposal of military aircraft and unrealistic production schedules of manufacturers were greatly responsible for the declining market available to the industry and gave a false picture as to the actual and practical utility of the light, modern, well-equipped planes that were to follow.

The reasons behind the early post-war boom and the recession that followed have long been history and no longer apply. However, from their instability, there emerged a strong and healthy agricultural and business market which has been constantly on the uptrend, providing a sizeable contribution to the Nation's economy. Light aircraft are now produced with the business and industry customer in mind first, and the pleasure flying prospect second. So called "private or pleasure" flying accounts for a small percentage of total hours flown today (See Table I).

The only other major setback suffered by general aviation occured during the Korean War, and it should be noted that the reason for this setback was primarily due to Government controls placed on production materials—not because of the lack of a market. In fact,

DISTRIBUTION of GENERAL AIRCRAFT


WEST OF MISSISSIPPI
ONE THIRD OF ALL PEOPLE IN UNITED STATES
ONE HALF OF ALL ACTIVE CIVIL AIRCRAFT
EAST OF MISSISSIPPI
TWO THIRDS OF ALL PEOPLE IN UNITED STATES
ONE HALF OF ALL ACTIVE CIVIL AIRCRAFT

it was through the efforts of agricultural, business and industry leaders that the Government was persuaded to release vital materials for civilian production. In 1952, there were 3100 light planes produced, and from that time the industry has stabilized itself and settled down to a steady growth that is expected to double by 1975 (See Table II). In 1957, for example, nine manufacturers reported 6118 one to ten-place utility and executive aircraft shipped at a retail value of $125 million dollars.

Active general aviation aircraft include almost every type of civil aircraft, from the smallest single-engine plane to large multi-engine transports identical to those in airline use,, and now number over 65,000 units in the United States alone. Their uses are many; for business purposes, for industry, agriculture, air taxis, for cargo, special charter service, instruction, research, survey and patrol work, and for non-business personal use.

It appeared to the author that, in order to provide a true and factual picture of the economic importance of general aviation, the best source of information would be the manufacturers themselves. The following data were solicited from major light aircraft builders who were asked questions relating to manpower requirements, floor space devoted to light aircraft production, machine-tool and production equipment inventories, material consumption, and future plans for expansion and increased sales. From the results, an idea of the importance of the industry can be obtained along with an indication of the optimistic outlook which exists for the future of light airplanes.

Similar questions were put to major suppliers producing aviation products, such as power plants, propellers, structural materials, navigation and radio equipment, etc. Part II of this article will be devoted to the results of this survey and will appear in a later issue of AUTOMOTIVE INDUSTRIES.

PIPER AIRCRAFT CORP.
Lock Haven, Penna.

Certainly one of the best known producers of light airplanes is the Piper Aircraft Corp., located at Lock Haven, Pa. Piper has four models currently in production: The Super Cub 95, designed for general instruction and utility flying; the Tri-Pacer line (see Fig. 1) which is engineered for safety in business, agriculture and personal air transportation; the Comanche, with a three-mile-a-minute cruising speed, and the Piper Apache which is a twin-engine company airplane having a cruising speed of over 170 mph.

Each of these airplanes is produced right at the Piper plant where, in 1957, 1562 people were employed. Approximately $1,800,000 dollars worth of machine-tool and production equipment is contained in over 400,000 sq-ft of design and production floor space—all devoted to the manufacture of these light, executive and utility type aircraft.

Although not comparable with high-performance military and commercial airplane production costs, the amount of money required for materials, components and parts that make up a light aircraft is quite impressive. For example, in 1957 Piper spent $3,850,000 for power plants, $850,000 for navigational aids, $450,000 for flight instruments, $600,000 for aluminum, $35,000 for aircraft batteries and $80,000 for tires.

BEECH AIRCRAFT CORP.
Witchita, Kansas

Among the planes manufactured by Beech Aircraft Corp. are the Super 18, the Twin-Bonanza, the Travel Air, the Bonanza (see Fig. 2) and the MS-760. The Mentor and the Jet Mentor are Beech aircraft built for the military.

Beechcraft employed 8128 people in 1957 who utilized $6,500,000 worth of machine-tool and production equipment to build its line of aircraft. Total amount of plant floor space devoted to design and

TABLE I

FORECAST OF HOURS FLOWN IN GENERAL AVIATION

By Type of Flying, 1954-1975

(millions of hours)

	1954	1960	1965	1970	1975
Business	3.9	6.9	9.5	13.0	16.0
Commercial	1.9	2.1	2.7	3.3	4.4
Instructional	1.3	1.5	1.7	1.8	2.0
Pleasure	1.9	2.2	2.4	2.9	3.4
	9.0	12.7	16.3	21.0	25.8

TABLE II

FORECAST OF THE GENERAL AVIATION FLEET

1955-1975

(thousands of aircraft)

	1954	1960	1965	1970	1975
Business	18.6	29.0	38.0	50.0	60.0
Commercial	8.6	10.0	14.0	17.0	20.0
Instructional	4.7	5.0	6.0	7.0	8.0
Pleasure	29.4	23.0	15.0	17.0	17.0
	61.3	67.0	73.0	90.0	105.0

FIG. 4—L. B. SMITH RE-ENGINEERED B-26 BOMBER, DESIGNED FOR EXECUTIVE TRANSPORTATION HAS TWO PRATT & WHITNEY R-2800-83AM3 ENGINES DELIVERING 2100 HP EACH

Cruising Speed	325 mph	Wing Span	70 ft
Useful Load	11,500 lb	Length	53 ft, 5 in
Empty Wt	23,500 lb	Height	18 ft
Ceiling	27,000 ft	Landing Wt	31,000 lb
Range	2100 m	Take-Off Wt	35,000 lb

production in the Beech plant is 1,898,351 sq-ft. During 1957 Beechcraft spent $8,775,000 for just four items necessary for a modern light aircraft — $4,366,000 for power plants, $3,814,000 for aluminum, $115,000 for aircraft batteries and $480,000 for tires.

CESSNA AIRCRAFT CO.
Witchita, Kansas

The Cessna line consists of seven models: the 150, 172, 175, 180, 182, the Skylane and the twin-engine Model 310B (see Fig. 3). These aircraft range in price from $6,995 for the Model 150 to $59,950 for the 310B. Cruising speeds range from 121 to 213 mph accordingly. All of these aircraft are designed for executive use.

During 1957, Cessna spent a total of $5,750,000 for power plants; $1,948,000 for navigational aids; $415,000 for flight instruments; $2,150,000 for aluminum; $64,000 for aircraft batteries; and $512,000 for tires. This represents total expenditures, both commercial and military.

Cessna's machine-tool and production equipment is valued at $5,228,000. And total amount of floor space is over 726,000 sq-ft. During 1957, average Cessna employment was 5556 people.

L. B. SMITH AIRCRAFT CORP.
Miami, Florida

Although not an original equipment manufacturer, the operations of the L. B. Smith Corp. are most interesting and typical of companies engaged in the rebuilding and modification of surplus military aircraft. To date three LBS aircraft - conversion - modifications have been awarded CAA certification. The Smith/CW20-T modification of the C-46; the Super 46 C modification of the same airplane; the Super B-26, business conversion-modification of the wartime B-26 bomber (see Fig. 4.)

Average annual employment necessary for carrying out these conversion-modifications is 500 people. Total area of floor space is 90,000 sq-ft. Total value of machine-tool and production equipment is in excess of $100,000. And total 1957 expenditures for power plants and navigational equipment was more than $500,000 dollars.

The foregoing examples serve to illustrate the fact that general aviation represents a favorable market area for producers of components, parts and supplies as well as machine-tool and production equipment. Industry leaders are all maintaining a very optimistic outlook, and plans for plant expansion and increased sales are prominent in most cases. The general opinion is that this field of aviation has hardly been scratched. One company spokesman had this to say—"there will be requirements, due to sales potential, for increased production and plant expansion of between 10 and 25 per cent per year on the average."

Light aircraft have found wide acceptance among the more progressive companies in the United States. Reasons are many and can best be illustrated by the users themselves. Following are several reports solicited from industry in general.

International Harvester Co.

Flight operations at International Harvester began over 11 years ago with the purchase of a war-surplus B-23. After four years, the company decided to expand flying activities with a second airplane. As nothing was available, at the time, of the type and size desired in new airplanes, Harvester sold the B-23 and bought two

DC-3's at a purchase price of $175,000 each. Since then several four-passenger, twin-engine Beechcraft airplanes have been added to the fleet at a cost of $130,000 dollars per unit.

Each of these planes is operated about 800 hours per year and is equipped with the latest type radio and navigation equipment. Almost all installations are of a duplicate nature in order to reduce the risk of failure of one complete system. Plans call for installing weather-searching radar in the entire fleet.

In 11 years of flying activities, Harvester has logged over 16,000 accident-free hours, or, more than 2½ million air miles. Many of these hours were flown under IFR (Instrument Flight Rules) conditions.

Uses for these planes range from making rush deliveries of service parts to getting the jump on a competitor who must schedule trips according to commercial time tables. Also, a definite dealer and customer relationship advantage is obtained as it is possible for company sales representatives to transport dealers, distributors, and important customers to the various factories to view engineering and research departments at work, and to observe the making of a product. For a company like Harvester, with plants and sales organizations throughout the country, the benefits of air travel are obvious.

The Fuller Brush Co.

The Grumman Mallard owned by the Fuller Brush Co. was flown 328.50 hours in 1957—27.05 under IFR flight rules. Aircraft operations started in 1944 with Fuller, and consist of executive transportation and special equipment delivery. Representing an initial cost of $125,000 dollars, the Mallard has been in service for 10 years.

"Resultant savings in time and effort have adequately demonstrated the economy of our aircraft usage. Fuller plans to maintain and expand its present utilization of corporate aircraft as occasion demands, as it is an accepted, tested and appreciated adjunct to executive travel," said a company spokesman.

W. A. Schaeffer Pen Co.

Due to a lack of commercial flights into the location of the W. A. Shaeffer Pen Co., Shaeffer owns and operates two Cessna 310's. These aircraft, which were bought at a cost of $174,000, are used solely for executive transportation. Their average age is one year and after three years of operation, they will be replaced.

Like many companies "out of reach" of the commercial carriers, Shaeffer has taken advantage of the convenience and time savings provided by privately owned, corporate aircraft.

Ohio Oil Co.

Ohio Oil Co. has invested a great deal of money in its fleet of business and utility type airplanes—over $2 million dollars. Due to the broad and varied interests of the company, its fleet consists of wide variety of planes. Among these are: DC-3, Lockheed Super Ventura, Beechcraft D18 and E18, Twin Bonanza, Travel Air Bonanza, De-Havilland Beaver, Piper Tri-Pacer and C-82 type aircraft.

The average age of single-engine planes is four years and the age of multi-engine ships averages three years from date of acquisition or modification. Ohio replaces both types after an average use period of from five to six years.

During 1957, Ohio Oil recorded 8715 hours, 1700 under "bad weather conditions." Since January, 1946 the company has operated its fleet for a grand total of over 68,435 hours.

Executive transportation, pipe line patrol, key and technical personnel transportation, aerial survey and freight transport are some of the many uses to which these aircraft are applied.

The company has recently utilized its aircraft in foreign operations where no other form of transportation can accomplish existing requirements and expects this phase to expand. Ohio Oil Co. is of the opinion that full utilization of its present fleet size can be economically continued in the future.

Smaller Companies

These examples of light aircraft used for business purposes are typical of hundreds of operations carried out daily. Corporate ownership is by no means limited to large companies as is evidenced by the fact that one third of the business planes now in use belong to organizations grossing less than $1 million a year.

Increasing Sales Foreseen

A comprehensive report on general aviation's requirements prepared for Edward P. Curtiss, President Eisenhower's Special Assistant for Aviation Facilities Planning by the General Aviation Facilities Planning Group (GAFPG), indicates that general aircraft annual flying is expected to reach 20 million hours by 1975. At that time there will be between 90,000 and 109,000 active General Aviation planes.

The decentralization of industry is one reason. Many corporations have found and will find it necessary to decentralize their operations in order to be near sources of raw materials, shipping points, manpower pools and supplier industries. Aircraft will play a major role in transporting key executives and technical personnel, making rush deliveries, transporting important customers to plant locations, etc. In many cases private or corporate aircraft will be the only means available for reaching scattered plant sites within a reasonable amount of time.

Out of America's 6000 airports only about 600 are serviced by commercial airlines. More and more factories "off the beaten path" of commercial carriers will find that light aircraft are worth their weight in gold due to savings in time alone.

Some industries would be at a complete loss were it not for utility aircraft. Imagine, if you will, the time and expense involved in patrolling pipe lines, making geodetic surveys and seeding and dusting crops without aircraft as tools. All phases of utility flying are expanding along with business flying and will continue to expand as long as men can pioneer new uses and applications for airplanes.

(*Turn to page* 45, *please*)

Report from the

FARM EQUIPMENT INDUSTRY

By Kenneth Rose

WHEN the Farm Equipment Institute held its annual meeting at Atlantic City, N. J. recently, presidents of some of the leading farm equipment manufacturing companies gave their opinions about the market for equipment. Here are excerpts from some of the comments:

Carl L. Hecker, pres., The Oliver Corp.—We believe that 1959 will at least equal 1958 in the farm machinery industry, and possibly be a little better. The farmer cannot neglect the fact that for the long pull he must purchase machinery that is cost-reducing from the viewpoint of greater output, higher quality of product, lower maintenance and operating costs, and greater ease, reliability, and safety in operation. There will be an increased demand for light industrial machinery.

Oliver hay conditioner

Oliver hay baler

The long term trends are quite clear—farms are rapidly becoming fewer and larger, and the farm population is decreasing substantially. Just as important for our business, wage rates for farm labor continue to increase. This and other pressures on farm operating costs greatly strengthens the demand for larger capacity farm equipment of all kinds, and will continue to be major factors in our domestic market in the foreseeable future.

The short term factors are problematical as always, but at this point their influence encourages some optimism for next year. Farmers in many areas will have the best crops in many years. Cash receipts from marketings plus Government payments are at a high level. As a result farmers generally should be in a good frame of mind for the 1959 crop year.

Frank W. Jenks, pres., International Harvester Co.—We look for a continuation of the steady upturn in business that began this year. The farmer is in a better frame of mind to buy new farm equipment. He has a higher income than he had last year, and it is expected that farm income will be maintained at a good level. There have been good crop yields;

(Turn to page 56, please)

Churchill Automatic Gear Line

for the

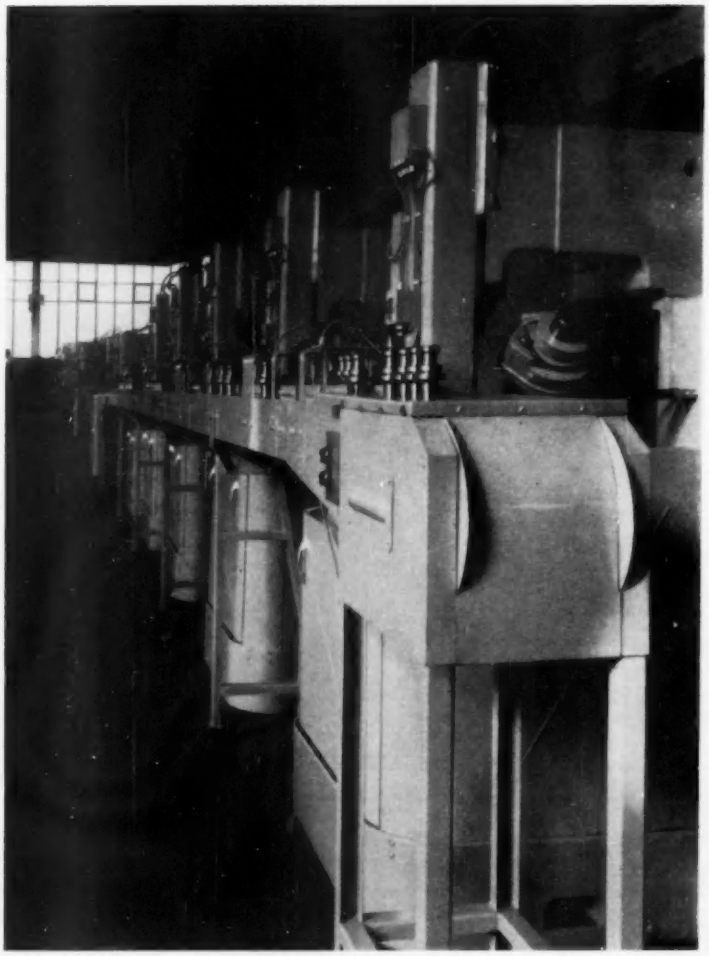
BRITISH MOTOR CORP.

By David Scott

ONE of the most advanced examples of automation produced by the British machine tool industry is a 175-ft gear line developed for the British Motor Corp. by Churchill Gear Machines Ltd., which is associated with the Cleveland Hobbing Machine Co. and Cincinnati Milling Machines Ltd. With a cycle time of 1.2 minutes it turns out completed four-gear countershafts from blanks in 25 minutes, using only two operators.

The line comprises 18 machines of six different kinds, including Churchill hobbers, shavers, chamferers and rounders, Fellows-England shapers, and a Newall grinder. All are standard types linked by two basic varieties of automatic loaders and two kinds of between-machine conveyors designed by Churchill. Advantages claimed for this use of standardized equipment are low design and installation costs, ease of service and maintenance, and flexibility of layout.

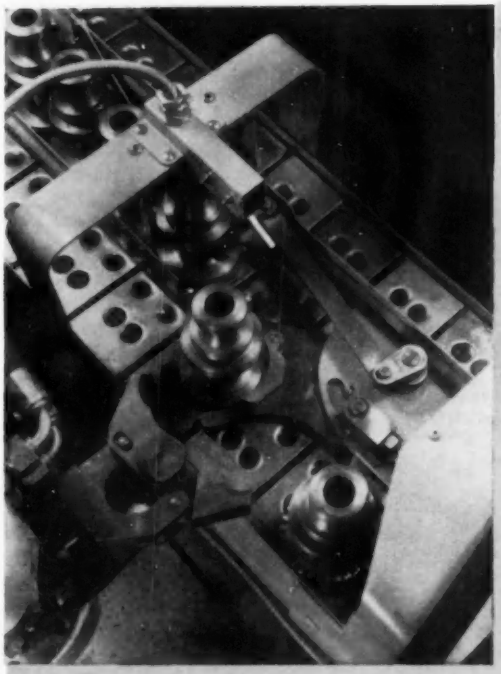
The production sequence starts with a bank of five hobbers, the first two doubling up to cut the large fourth-speed gear, the second pair similarly machining the third gear, and the last one hobbing the small first gear. Blanks in a vertical position are carried through this section of the line by a slat-type conveyor, and at the first machine are initially diverted into a small storage bank. When this area is full, components are automatically deflected to bypass it and are conveyed on to the storage bank for the duplicate hobber.

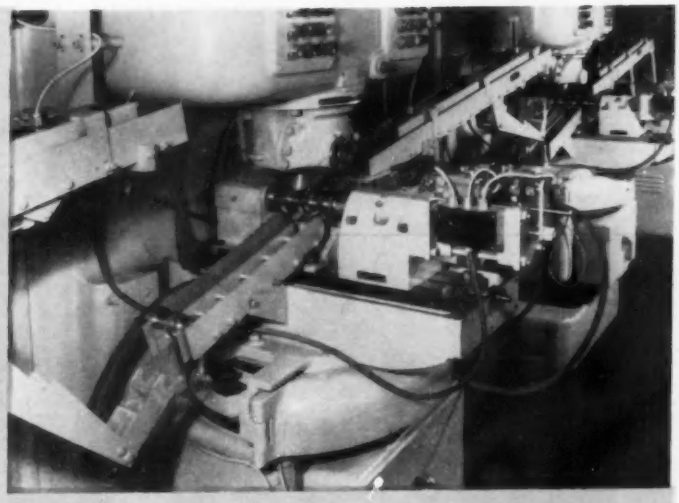


GENERAL VIEW

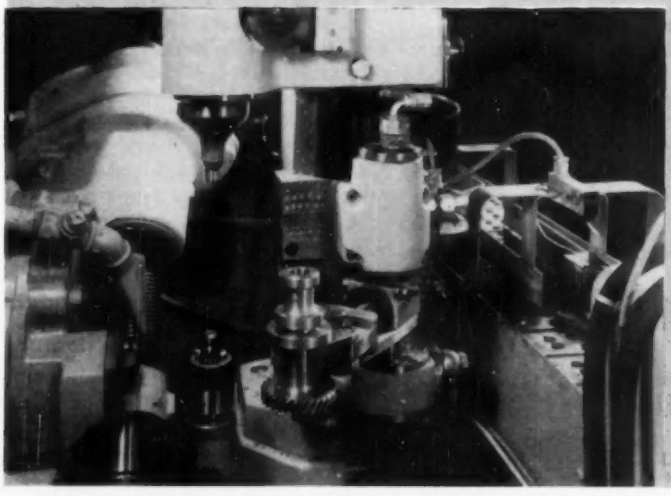
The Churchill gear line is 175 ft long and comprises 18 cutting machines, linked by automatic loaders and conveyors, together with four washing and three gaging stations.

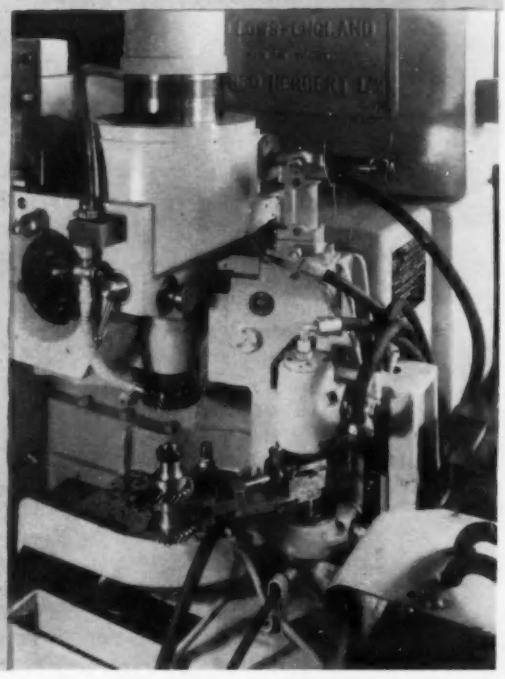
The first blank to reach the No. 1 machine actuates a microswitch as it moves into the preload arm which slides it across the conveyor to the pickup position. There the transfer arm grips it and swings it through 180 deg for loading into the hobber. At the same time the





CLOSE-UPS of GEAR LINE





Top—Close-up of a preload arm that slides layshafts from the storage bank into the open jaws of the waiting transfer arm that loads the first hobber.

Bottom—Close-up of the transfer arm that picks a shaft off the conveyor and swings it through 180 degrees for loading in one of the hobbers.

Top—Tables on the four Churchill Red Ring shavers are turned through 90 deg to permit flow-line production. Auto-loaders are fed by standard conveyors.

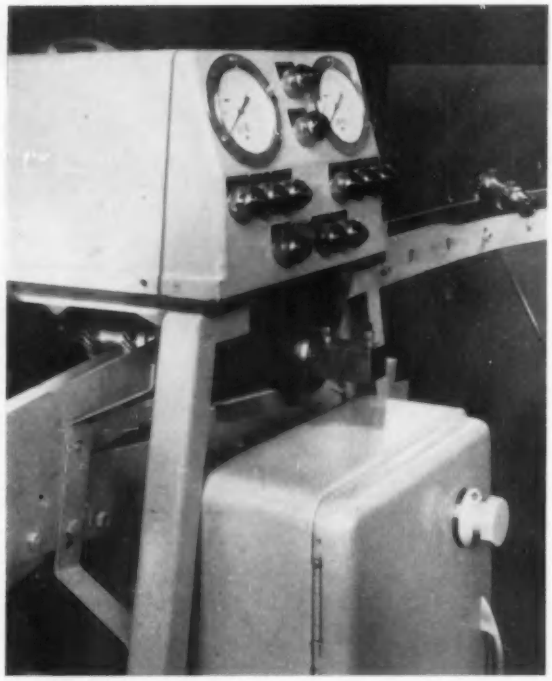
Bottom—Transfer arm applied to one of the three shapers where the blind second-speed gear is cut.

preload arm returns to the center of the conveyor to receive the next component when the cycle is completed.

After the fourth gear is cut the transfer arm returns the shaft to the conveyor on the inmost of the three tracks into which it is divided, and moves ahead to bypass the No. 2 machine.

A magnetically-operated safety gate prevents the shaft from passing this machine while it is being loaded and its transfer arm is obstructing the channel.

Blanks cut on the first two hobbers converge on a common track following machine No. 2, after which there is the same type of conveyor channeling loading mechanisms for the paralleled machines



Close-up of the first automatic gage, where the three hobbed gears are checked for size and lead in three radial positions.

No. 3 and 4 which cut the third gear. The first gear on all shafts is then hobbed on No. 5.

This system of conveyors permits individual operation of the machines, any one of which can be stopped for tool change without affecting the others, and automatically restarted when a component moves into the preload arm.

Shafts leaving the hobbing section now pass to the end of the conveyor, where they drop over onto horizontal guides and roll to the Churchill Gear-Wash. Here oil and swarf are removed with a high-pressure hot chemical spray. This is of short duration so as not to raise the temperature of the component to affect the subsequent gaging. Components are then dried by a system of air jets.

The automatic gage that follows is built by Churchill and incorporates Sigma pneumatic heads. Shafts arriving by gravity rails trigger off an air valve mechanism that programs the complete gaging cycle. The work is positioned on its bore chamfers by an air-operated high-precision head and tailstock.

Three auto-gaging heads then advance in sequence to check their respective gears for size and lead, after which concentricity is switched by repeating the operations twice following two 120-deg rotations of the shaft. Signal lights as well as calibrated dials give visual indications of results, and off-size components are passed to a reject chute.

Acceptable shafts are returned to a vertical position as they leave the gage, and are carried on the next length of slat conveyor to the bank of three Fellows-England shapers made by Alfred Herbert. These machines cut the blind second-speed gear, and are paralleled to meet the required cycle time. They are equipped with the same type of hydraulically-operated transfer arms and tailstocks for automatic loading as on the hobbers. The conveyor with storage areas, bypass channels and preload arms also is similar. An auto-wash and a single gaging unit for this one gear follow.

The next group of five Churchill machines consists of two rounding machines for the first spur gear and three chamferers for the fourth, third and second helical gears. These are fed and linked by horizontal-axis conveyors, each comprising an inclined supply chute with air-operated elevating arms that pick up the unloaded work from the previous machine and raise it to the upper end of the conveyor.

Shafts roll by gravity down the chute, which has a series of pawls that space the gears to prevent damage. Microswitches at both ends signal the appropriate machines to stop when the chutes are either full or empty.

Layshafts are transferred from the supply chute to the cutting position on the rounders by a shuttling auto-loader whose cycling is controlled by electrical interlocks. Work is held by an air-operated tailstock and turned by a geared headstock that oscillates the table for contouring the gear teeth. The vertical tool spindle on these two machines retracts to allow automatic loading of components.

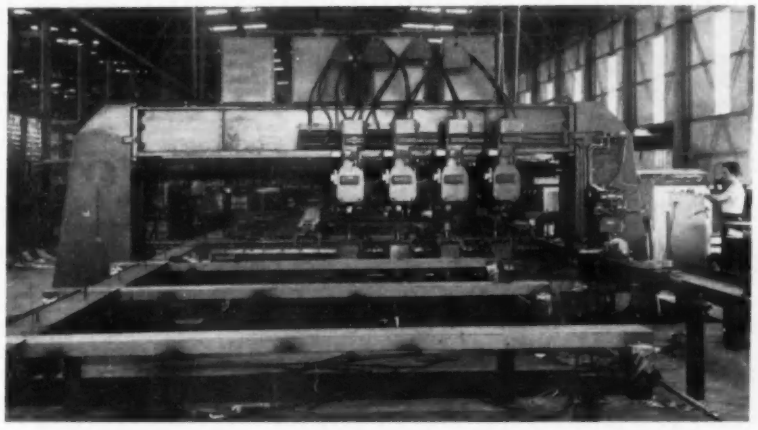
Transfer and loading mechanisms for the subsequent chamferers are similar. The teeth are meshed in backlash with a rotary cutter that is rapidly moved down under controlled pressure into full engagement with the gear, then reciprocated to chamfer both sides of the teeth.

Provision is made for future inclusion in the line of an automatic brushing machine. Meanwhile, shafts are passed through a washer, then deburred by hand and loaded onto the supply chute of the first of four Churchill Red Ring shavers. These are linked by standard horizontal conveyors and autoloaders, and successively finish the four gears on the cluster.

Another washer follows, after which a final gage with four heads automatically checks each gear in three radial positions. When the number of rejects is excessive, the faulty machines are stopped pending investigation.

From here, shafts roll into a storage bank feeding a Newall grinder that finishes the outside diameters of the three helical gears with a profiled wheel. The pneumatic loader is similar to the transfer arms on the hobbers and shapers except that it is applied to the horizontal axis. Layshafts are now completely machined and ready for heat treatment. ■

Automatic Riveter for Trailer Bodies



Dorsey Trailers' automatic riveting machine installed on the assembly line at the Elba, Ala., plant.

AN electronically-controlled Drivmatic riveter, of the type previously used exclusively by major aircraft manufacturers, has been installed by Dorsey Trailers of Elva, Ala. The new machine which installs the rivets for a trailer's sides, front and roof in less than one hour, was built by General Riveters, Inc.

The Dorsey installation involved the adaptation of Drivmatic riveters to a bridge-type structure large enough to handle an entire van side as a complete unit. The machine has four riveting heads and is the first multiple unit Drivmatic has produced.

The basic Drivmatic principle combines into one continuous cycle the following individual operations: 1. Clamping side sheet and stiffener post together at the point to be riveted. 2. Drilling rivet hole. 3. Inserting rivet. 4. While rivet head is held by bucking anvil, a hydraulically-powered ram below upsets the bottom of the slug with a squeezing action. The pressure also tightens the rivet in the hole.

With all four heads operating, the machine installs 80 rivets a minute and runs continuously for the length of a side post, then rivets the next run in the other direction. Electronic controls activated by a template guide the operation.

The sheets and stiffeners for a complete trailer side are first assembled in a frame, which then moves through the riveting machine on a table. The machine starts riveting at one panel corner, goes down one row of rivets, jumps to the next row and comes back, then to the next row, etc. Meanwhile, the frame serves as a jig to hold the structure in position. ■

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What General Aviation Means to the National Economy

(*Continued from page* 40)

Although prospects for general aviation are extremely favorable, it should be mentioned that there are still several drawbacks facing the industry. One is difficulty of convincing the public of the safety of flying and that one need not be a marvel of coordination and physical stamina in order to learn to fly.

Another problem is that the industry has long had difficulty in reaching new customers due to a lack of a proper sales outlet. Substantial percentages of new aircraft sold during any given period go to old buyers who are expanding operations or replacing used aircraft. However, the industry is hard at work improving sales organizations, public relations, maintenance and service, etc.

Problems? Yes! But by no means insurmountable. Like any industry, general aviation has suffered from growing pains, but it has evolved to a stable and prosperous industry and these problems will no doubt be overcome.

In view of its past progress and in consideration of its potential growth there can be no doubt as to General Aviation's increasing relative value to our economy. General Aviation means many things to many people but to those most directly concerned it is an important, necessary, beneficial and integral part of a progressive Nation and is destined for a major role in America's future. The keynote for general aviation is optimism and expansion—and rightly so.

* * *

The author wishes to express his appreciation to the following organizations for their cooperation in supplying material used in the preparation of this article: Aircraft Industries Association; National Business Aircraft Association; Aircraft Owner And Pilots Association; National Aviation Trades Association; Piper Aircraft Corp.; Beech Aircraft Co.; Cessna Aircraft Corp.; Aero Design & Engineering Co.; L. B. Smith Aircraft Corp.; Grumman Aircraft Engineering Corp.; International Harvester Co.; Ohio Oil Co.; W. A. Shaeffer Pen Co.; and Fuller Brush Co. ■

1958 Motor Vehicle Registrations Up 1.8%

By Marcus Ainsworth

WHILE motor vehicle registrations in 1958 will show an increase of approximately 1.8 per cent over 1957, this is the lowest gain of one year over another since 1946, which had an increase of 10.7 per cent over 1945. All intervening years registered an increase, but since 1955 these increases have been at a declining rate, dropping from 6.9 per cent in that year, to 4.0 per cent in 1956, and 3.4 per cent in 1957. At present, four states indicate that their total registrations will decline from those in 1957 with Michigan recording a minus 2.7 per cent, South Carolina 2.0 per cent, North Carolina 1.5 per cent and West Virginia 0.8 per cent. ■

Forecast of 1958 Motor Vehicle Registrations

As of the end of the Registration Year

These data do not include publicly owned vehicles of which there were approximately 826,000 in 1957.

State	Passenger Cars		Per Cent Change	Trucks and Buses		Per Cent Change	Total Motor Vehicles		Per Cent Change
	1958	1957		1958	1957		1958	1957	
Alabama	894,200	868,665	+ 2.9	200,836	197,987	+ 1.4	1,095,036	1,066,652	+ 2.7
Arizona	406,700	380,030	+ 7.0	107,000	99,842	+ 7.2	513,700	479,872	+ 7.0
Arkansas	445,600	434,204	+ 2.6	191,900	183,166	+ 4.8	637,500	617,372	+ 3.3
California	6,090,000	5,877,170	+ 3.6	860,000	840,202	+ 2.3	6,950,000	6,717,372	+ 3.5
Colorado	654,147	632,196	+ 3.5	179,884	177,848	+ 1.1	834,021	810,046	+ 3.0
Connecticut	926,706	888,735	+ 4.3	110,964	113,350	− 2.1	1,037,672	1,002,085	+ 3.6
Delaware	122,328	120,861	+ 1.2	37,287	35,424	+ 5.3	159,615	156,285	+ 2.1
District of Columbia	172,149	172,292	− 0.1	19,458	18,972	+ 2.6	191,607	191,264	+ 0.2
Florida	1,794,464	1,678,791	+ 6.3	271,892	267,556	+ 1.6	2,056,356	1,946,347	+ 5.6
Georgia	1,065,000	1,053,208	+ 1.1	254,000	250,591	+ 1.4	1,319,000	1,303,799	+ 1.2
Idaho	240,000	237,844	+ 0.9	92,000	88,120	+ 4.4	332,000	325,964	+ 1.9
Illinois	3,103,931	3,076,908	+ 0.9	417,426	436,429	− 4.4	3,521,357	3,513,334	+ 0.2
Indiana	1,580,000	1,563,713	+ 1.0	327,000	328,216	− 0.4	1,907,000	1,891,929	+ 0.8
Iowa	1,003,100	985,405	+ 1.8	222,667	216,102	+ 2.1	1,225,767	1,203,507	+ 1.8
Kansas	933,000	921,820	+ 1.2	412,000	413,130	− 0.3	1,345,000	1,334,950	+ 0.7
Kentucky	890,800	879,165	+ 1.3	221,760	213,773	+ 3.7	1,112,560	1,092,938	+ 1.8
Louisiana	875,000	853,731	+ 2.5	211,000	209,674	+ 0.6	1,086,000	1,063,405	+ 2.1
Maine	282,923	275,166	+ 2.8	70,572	70,453	+ 0.2	353,495	345,621	+ 2.3
Maryland	903,838	886,800	+ 2.0	136,741	137,586	− 0.6	1,040,580	1,023,386	+ 1.7
Massachusetts	1,490,000	1,473,629	+ 1.7	181,950	186,785	− 2.6	1,679,950	1,660,414	+ 1.2
Michigan	2,721,396	2,806,789	− 3.0	380,216	381,414	− 0.3	3,101,612	3,188,203	− 2.7
Minnesota	1,174,688	1,158,583	+ 1.4	249,137	246,123	+ 1.2	1,423,825	1,404,706	+ 1.4
Mississippi	468,450	460,971	+ 1.6	176,000	172,996	+ 1.7	644,450	633,967	+ 1.7
Missouri	1,290,000	1,266,173	+ 1.1	319,800	299,807	+ 6.7	1,599,800	1,565,980	+ 2.1
Montana	246,000	243,507	+ 1.0	104,500	101,177	+ 3.3	350,500	344,684	+ 1.7
Nebraska	505,975	504,303	+ 0.3	152,200	149,930	+ 1.5	658,175	654,233	+ 0.6
Nevada	113,000	106,550	+ 6.1	32,000	29,794	+ 7.4	145,000	136,344	+ 6.3
New Hampshire	195,000	186,096	+ 4.8	35,000	37,095	− 5.7	230,000	223,191	+ 3.0
New Jersey	1,890,000	1,868,142	+ 1.2	287,000	282,810	+ 1.5	2,177,000	2,150,952	+ 1.2
New Mexico	293,000	275,201	+ 6.5	99,500	94,014	+ 5.8	392,500	369,215	+ 6.3
New York	4,290,000	4,249,372	+ 1.0	515,600	507,552	+ 1.6	4,805,600	4,756,924	+ 1.0
North Carolina	1,230,000	1,249,861	− 1.6	308,000	311,272	− 1.1	1,538,000	1,561,133	− 1.5
North Dakota	215,000	214,151	+ 0.4	102,500	102,361	+ 0.1	317,500	316,512	+ 0.3
Ohio	3,410,000	3,339,672	+ 2.1	416,000	414,678	+ 3.0	3,826,000	3,754,350	+ 1.9
Oklahoma	819,000	803,694	+ 1.9	261,000	252,019	+ 3.6	1,080,000	1,055,713	+ 2.3
Oregon	756,000	744,385	+ 1.6	70,320	70,216	+ 0.1	826,320	814,601	+ 1.4
Pennsylvania	3,439,100	3,426,391	+ 0.4	643,000	585,351	+ 9.8	4,082,100	4,011,742	+ 1.7
Rhode Island	263,850	273,018	+ 4.0	38,280	37,720	+ 1.5	322,130	310,738	+ 3.7
South Carolina	665,000	652,589	+ 1.9	123,000	151,607	−18.9	788,000	804,206	− 2.0
South Dakota	245,000	239,352	+ 2.4	87,800	85,425	+ 2.8	332,800	324,777	+ 2.5
Tennessee	982,400	972,818	+ 2.0	216,100	214,131	+ 0.9	1,206,500	1,186,949	+ 1.6
Texas	3,330,000	3,231,426	+ 3.0	805,100	793,443	+ 1.5	4,135,100	4,024,869	+ 2.7
Utah	300,000	295,130	+ 1.6	70,000	68,242	+ 2.6	370,000	363,372	+ 1.8
Vermont	129,500	128,500	+ 0.8	15,290	15,500	− 1.4	144,790	144,000	+ 0.5
Virginia	1,167,500	1,111,782	+ 5.0	229,250	221,085	+ 3.7	1,396,750	1,332,867	+ 4.8
Washington	1,042,550	994,443	+ 4.8	224,300	209,414	+ 7.1	1,266,850	1,203,857	+ 5.2
West Virginia	480,800	480,825	None	125,800	130,815	− 3.8	606,600	611,640	− 0.8
Wisconsin	1,245,000	1,221,500	+ 1.9	250,000	246,362	+ 0.6	1,495,000	1,468,862	+ 1.7
Wyoming	123,600	123,306	+ 0.2	54,600	53,623	+ 1.8	178,200	176,931	+ 0.7
Total	56,923,698	55,897,575	+ 1.9	10,917,639	10,755,204	+ 1.5	67,841,329	66,642,780	+ 1.8

Selected Data of the 1959 Passenger Cars

All dimensions, weights and prices apply to lowest priced four-door sedan or nearest equivalent model

MAKE AND MODEL	Wheelbase (In.)	OVERALL DIMENSIONS (In.) Length Incl. Bumpers	Width	Height (Loaded)	Tire Size	ENGINE (STD.) Number of Cylinders, Bore & Stroke (In.)	Displacement (cu. in.)	Compression Ratio – to 1	Taxable Hp.	Max. Brake Hp. at Specified Rpm	Max. Torque (Lb. Ft. at Rpm)	Shipping Weight (lbs.)	Retail Price at Factory†
AMERICAN MOTORS CORP.													
Rambler American 5906-5904	100	178.3	73.0	57.3	5.90/15	6-3.125x4.25	195.6	8.0	23.44	90-3800	150-1600	2476	1835
Rambler 6-5910	108	191.1	72.2	58.0	6.40/15	6-3.125x4.25	195.6	8.7	23.44	127-4200	180-1600	2934	2098
Rebel V-8, 5920	108	191.1	72.2	57.8	7.50/14	8-3.50x3.25	250.0	8.7	39.20	215-4900	260-2500	3274	2228
Ambassador V-8, 5980	117	200.1	72.2	57.6	8.00/14	8-4.00x3.25	327.0	9.7	51.20	270-4700	360-2600	3428	2587
CHRYSLER CORP.													
Chrysler Windsor MC1-L	126	216.6	79.3	56.8	8.00/14	8-4.03x3.75	383.0	10.1	52.0	305-4600	410-2400	3800	3139
Saratoga MC2-M	126	220.6	79.3	57.2	8.50/14	8-4.03x3.75	383.0	10.1	52.0	325-4600	425-2800	4010	3891
New Yorker MC3-H	126	220.9	79.5	57.5	9.00/14	8-4.18x3.75	413.0	10.1	55.9	350-4600	470-2800	4120	4334
300E, MC3-H	126	220.9	79.5	55.3	9.00/14	8-4.18x3.75	413.0	10.1	55.9	380-5000	450-3600	4290	5229
De Soto FireSweep MS1-L	122	217.1	78.7	56.8	8.00/14	8-4.12x3.38	361.0	10.0	54.3	290-4600	390-2400	3670	2983
Firedome MS2-M	126	221.1	78.7	57.1	8.50/14	8-4.25x3.38	383.0	10.1	57.8	305-4600	410-2400	3840	3333
FireFlite MS3-H	126	221.1	78.7	57.1	8.50/14	8-4.25x3.38	383.0	10.1	57.8	325-4600	425-2800	3920	3813
Adventurer MS3-H	126	221.1	78.7	55.0	8.50/14	8-4.25x3.38	383.0	10.1	57.8	350-5000	425-3600	3980	4352
Dodge Coronet 6, MD1-L	122	217.4	80.0	56.6	7.50/14	6-3.25x4.63	230.0	8.0	25.3	135-3600	205-1200	3425	2537
Coronet V-8, MD2-L	122	217.4	80.0	56.6	7.50/14	8-3.95x3.31	326.0	9.2	49.9	255-4400	350-2400	3615	2657
Royal, MD3-M	122	217.4	80.0	54.3	8.00/14	8-4.12x3.38	361.0	10.1	54.3	295-4600	390-2400	3640	2884
Custom Royal, MD3-H	122	217.4	80.0	54.3	8.00/14	8-4.12x3.38	361.0	10.1	54.3	305-4600	400-2800	3660	3095
Imperial: MY1-L, MY1-M, MY1-H	129	226.3	81.0	56.8	9.50/14	8-4.18x3.75	413.0	10.1	55.9	350-4600	470-2800	4735	4926
Plymouth Savoy, Belvedere, MP1	118	210.0	80.3	56.6	7.50/14	6-3.25x4.62	230.0	8.0	25.3	132-3600	205-1200	3275	2283
Savoy, Belvedere, Fury, MP2	118	210.0	80.3	56.6	7.50/14	8-3.91x3.31	318.0	9.0	48.9	230-4400	340-2400	3425	2402
Sport Fury, MP2-P	118	210.0	80.3	54.1	7.50/14	8-3.91x3.31	318.0	9.0	48.9	260-4400	345-2800	3475	2927
FORD MOTOR CO.													
Edsel Ranger	120	210.9	79.8	56.0	7.50/14	8-3.75x3.30	292.0	8.8	45.0	200-4400	285-2200	3673	2684
Corsair	120	210.9	79.8	56.2	8.00/14	8-4.00x3.30	332.0	8.9	51.2	225-4400	325-2200	3696	2812
Ford Custom 300, Fairlane, Fairlane 500	118	208.0	76.6	56.0	7.50/14	6-3.62x3.60	223.0	8.4	31.5	145-4000	206-2200	.....	2273
Custom 300, Fairlane, Fairlane 500	118	208.0	76.6	56.0	7.50/14	8-3.75x3.30	292.0	8.8	45.0	200-4400	285-2200	3485	2391
Lincoln Lincoln, Premiere, Continental	131	227.1	80.1	56.7	9.50/14	8-4.30x3.70	430.0	10.0	59.2	350-4400	490-2800	4823	5090
Mercury Monterey	126	217.8	80.7	55.7	8.00/14	8-3.80x3.44	312.0	8.7	46.2	210-4400	325-2200	3902	2832
Montclair	126	217.8	80.7	56.0	8.50/14	8-4.30x3.30	383.0	10.0	59.2	322-4600	420-2800	4158	3308
Park Lane	128	222.8	80.7	56.1	9.00/14	8-4.30x3.70	430.0	10.0	59.2	345-4400	480-2800	4388	4031
Thunderbird	113	205.3	77.0	52.5	8.00/14	8-4.00x3.50	352.0	9.6	51.2*	300-4600	395-2800	3813	3696
GENERAL MOTORS CORP.													
Buick LeSabre 4400	123	217.4	80.7	57.1	7.60/15	8-4.125x3.40	364.0	10.5	54.4	250-4400	384-2400	4229	2804
Invicta 4600	123	217.4	80.7	57.1	7.60/15	8-4.187x3.64	401.0	10.5	56.1	325-4400	445-2800	4331	3357
Electra 4700, 4800	126	220.6	80.7	57.3	8.00/15	8-4.187x3.64	401.0	10.5	56.1	325-4400	445-2800	4557	3856
Cadillac 62, 60, 75	130	225.0	80.2	53.7	8.00/15	8-4.00x3.875	390.0	10.5	51.2	325-4800	430-3100	4770	5080
Chevrolet 6-Biscayne, Bel Air, Impala	119	210.9	79.9	56.0	7.50/14	6-3.56x3.94	235.5	8.25	30.4	135-4000	217-2200	3610	2301
8-Biscayne 1200, Bel Air 1600, Impala 1800	119	210.9	79.9	56.0	7.50/14	8-3.875x3.00	283.0	8.50	48.0	185-4600	275-2400	3619	2419
Corvette 8-867	102	177.2	72.8	51.6	6.70/15	8-3.875x3.00	283.0	9.50	48.0	230-4800	300-3000	2842	3875
Oldsmobile Dynamic 88	123	218.4	80.8	56.0	8.50/14	8-4.00x3.69	371.0	9.75	51.0	270-4600	390-2400	4162	2902
Super 88	123	218.4	80.8	56.0	9.00/14	8-4.125x3.69	394.0	9.75	54.0	315-4600	435-2800	4202	3178
Ninety Eight	126	223.0	80.8	56.0	9.00/14	8-4.125x3.69	394.0	9.75	54.0	315-4600	435-2800	4433	3890
Pontiac Catalina 59-21, Star Chief 59-24	122	213.7	80.7	56.4	8.00/14	8-4.06x3.75	389.0	8.60	52.8	245-4200	392-2000	3955	2704
Bonneville 59-28	124	220.7	80.7	54.6	8.00/14	8-4.06x3.75	389.0	8.60	52.8	260-4200	400-2800	4085	3333
STUDEBAKER-PACKARD CORP.													
Studebaker Lark 6-59S	108	175.0	71.4	57.5	5.90/15	6-3.00x4.00	169.6	8.30	21.6	90-4000	145-2000	2605	1995
Lark 8-59B	108	175.0	71.4	57.5	6.40/15	8-3.56x3.25	259.2	8.80	40.6	180-4500	260-2800	2924	2310
Silver Hawk 6	120	204.0	71.3	55.5	6.40/15	6-3.00x4.00	169.6	8.30	.....	90-4000	145-2000	.....	2360
Silver Hawk 8	120	204.0	71.3	55.5	6.70/15	8-3.56x3.25	259.2	8.80	.....	180-4500	260-2800	.....	2495

† Does not include transportation charges, state or local taxes or any optional equipment.

• • INDUSTRY STATISTICS • •

WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Make	Weeks Ending Nov. 15	Weeks Ending Nov. 8	Year to Date 1958	Year to Date 1957
PASSENGER CAR PRODUCTION				
Rambler	6,120	7,277	171,741	94,246
Total—American Motors	6,120	7,277	171,741	94,246
Chrysler	450	1,368	42,686	107,715
De Soto	442	1,335	31,502	109,311
Dodge	1,452	4,034	99,382	265,767
Imperial	146	497	10,685	34,511
Plymouth	3,441	11,308	320,530	590,907
Total—Chrysler Corp.	5,931	18,542	504,785	1,108,211
Edsel	1,330	1,262	16,062	51,634
Ford	34,230	32,357	835,842	1,334,815
Lincoln	718	726	20,935	32,824
Mercury	4,041	3,316	96,699	247,746
Total—Ford Motor Co.	40,319	37,663	969,538	1,667,019
Buick	9,483	9,411	194,224	345,753
Cadillac	3,539	3,091	100,910	133,138
Chevrolet	32,771	30,402	994,607	1,276,655
Oldsmobile	9,156	8,995	246,146	331,789
Pontiac	7,499	7,009	165,624	291,419
Total—General Motors Corp.	62,448	58,908	1,701,511	2,378,754
Packard			1,723	4,733
Studebaker	2,874	2,880	36,814	61,056
Total—Studebaker-Packard Corp.	2,874	2,880	38,537	65,789
Checker Cab	106	92	2,593	3,584
Total—Passenger Cars	117,798	125,362	3,388,705	5,317,603
TRUCK AND BUS PRODUCTION				
Chevrolet	8,350	8,426	223,617	307,354
G. M. C.	1,965	1,874	51,162	80,331
Diamond T	139	123	4,999	5,034
Divco	70	70	2,562	2,499
Dodge and Fargo	650	1,922	48,113	69,018
Ford	7,838	7,231	201,092	301,803
F. W. D.	27	18	1,105	959
International	1,365	2,273	79,796	106,274
Mack	283	271	12,352	15,220
Studebaker	272	304	8,845	12,353
White	416	419	15,038	16,870
Willys	2,373	2,020	78,270	66,527
Other Trucks	50	55	2,530	3,723
Total—Trucks	23,798	25,006	729,481	967,965
Buses	60	35	2,727	3,515
Total—Motor Vehicles	141,656	150,403	4,120,913	6,289,083

1958 TRUCK TRAILER SHIPMENTS

Industry Division, Bureau of the Census

Type of Trailer	September	Nine Months 1958	Nine Months 1957
Vans			
Insulated and refrigerated	317	2,541	3,665
Steel	19	271	500
Aluminum	298	2,270	3,165
Semi-insulated	38	407	493
Steel	6	407	85
Aluminum	32		408
Furniture	83	1,179	1,291
Steel	79	1,179	1,291
Aluminum	4		
All other closed top	1,812	11,970	15,767
Steel	533	3,955	7,159
Aluminum	1,279	8,015	8,608
Open-top	231	1,522	2,480
Steel	103	775	1,267
Aluminum	128	1,522	1,213
Total—Vans	2,481	17,619	23,696
Tanks			
Non- and low pressure			
Petroleum			
Carbon and alloy steel	205	1,661	
Stainless steel	23	160	
Aluminum	148	1,030	
Total—Petroleum	376	2,851	3,739
Chemical, food, fluid solids	19	447	
All other, incl. aircraft refuelers	54	352	
High pressure (LPG, chemicals, etc.)	35	233	
Total—Tanks	484	3,883	5,085
Pole, pipe and logging			
Single axle	33	252	424
Tandem axle	66	418	584
Total	99	670	1,008
Platforms			
Racks, livestock and stake	79	1,097	1,914
Grain bodies, all types	116	733	1,116
Platforms (flats), all types	649	4,431	5,473
Total—Platforms	844	6,261	8,503
Low-bed heavy haulers	212	1,833	2,392
Dump trailers	169	1,902	1,709
All other trailers	153	1,469	2,792
Total—Complete Trailers	4,442	33,637	45,185
Trailer chassis[1]	342	2,453	3,495
Total—Trailers and Chassis	4,784	36,090	48,680

[1] Sold Separately.

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	September 1958	August 1958	September 1957	Nine Months 1958	Nine Months 1957	Per Cent Change: Sept. over August	Sept. over Sept. 1957	Nine Months 1958 over 1957
1	New England	20,278	20,022	26,904	196,167	247,760	+ 1.28	−24.63	−20.82
2	Middle Atlantic	58,462	72,997	91,991	676,934	887,976	−19.91	−36.45	−23.77
3	South Atlantic	45,828	51,121	64,888	449,606	587,067	−10.35	−29.37	−23.41
4	East North Central	71,874	85,939	119,955	804,550	1,134,660	−16.37	−40.08	−29.09
5	East South Central	12,679	16,102	22,510	149,227	220,736	−21.28	−43.69	−32.40
6	West North Central	30,744	36,044	44,438	336,937	402,729	−14.70	−30.82	−15.84
7	West South Central	27,199	34,019	45,620	314,211	429,503	−20.05	−40.38	−26.84
8	Mountain	13,145	14,543	17,107	129,454	154,382	− 9.61	−23.16	−16.15
9	Pacific	40,900	44,393	61,804	410,786	536,382	− 7.87	−33.82	−23.42
	Total—United States	321,106	375,180	495,217	3,469,872	4,601,195	−14.41	−35.16	−24.59

States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt. Zone 2—N. J., N. Y., Pa. Zone 3—Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va. Zone 4—Ill., Ind., Mich., Ohio, Wis. Zone 5—Ala., Ky., Miss., Tenn. Zone 6—Iowa, Kan., Minn., Mo., Neb., N. D., S. D. Zone 7—Ark., La., Okla., Tex. Zone 8—Ariz., Colo., Ida. Mont., Nev., N. M., Utah, Wyo. Zone 9—Cal., Ore., Wash.

1958 TRUCK FACTORY SALES BY G.V.W.

As reported by the Automobile Manufacturers Association

Period	6,000 lb. and less	6,001-10,000 lb.	10,001-14,000 lb.	14,001-16,000 lb.	16,001-19,500 lb.	19,501-26,000 lb.	26,001-33,000 lb.	33,000 lb. and over	Total
First Quarter	111,337	32,659	3,507	22,913	25,006	13,661	8,674	6,725	224,482
Second Quarter	104,199	33,127	3,804	23,112	26,619	14,025	6,984	7,996	219,865
Total—Six Months	215,535	65,786	7,311	46,025	51,625	27,686	15,658	14,721	444,347
July	32,956	9,271	1,005	7,223	6,502	3,619	2,083	2,387	65,048
August	26,455	8,161	859	4,380	7,246	3,936	2,191	1,999	55,227
September	22,592	6,346	711	3,449	5,004	3,291	2,566	2,399	46,358
Total—Nine Months—1958	297,540	89,564	9,886	61,077	70,377	38,532	22,498	21,506	610,980
Total—Nine Months—1957	402,109	121,660	29,135	126,026	55,809	41,143	29,870	26,811	832,563

The White 5000 features lightweight construction with capacity for heavy loads

White's New 5000 Series Trucks Designed to Haul Maximum Loads

ANTICIPATING the "needs of tomorrow," White Motor Company has designed its new 5000 line of highway tractors to haul maximum loads under current regulations in every state, with a margin for upward expansion in the future.

The new White series features lightweight construction, compact design and Diesel engines up to 262 hp. The lightweight construction, coupled with heavy duty major components, permits payloads of 80,000 GCW and higher. The compact design permits longer square nose trailers in even the 50 and 60 ft overall length limit states.

Key to the light weight is the molded fibreglass cab, which was described in AI Nov. 15, p. 136. Key to the compact design is the 50-in. bumper to back of cab dimension, with the Diesel engine and all mechanical units contained within the 50-in. dimension.

The standard chassis, or Lightweight 5000, weighs 10,570 lb, less fuel and fifth wheel. The more aluminized Ultralight 5000, less fuel and fifth wheel, weighs 9225 lb. White already is in production on the Lightweight 5000.

Aiding in weight reduction is the cab under-frame of high-tensile aluminum extrusions with bolted construction. Tubular cross-members at the front of the underframe give torsional stability.

A second substantial weight reduction comes in the use of aluminum for the transmission case. The nine-speed Clark Synchromesh, with power shift assist, is standard on all models. A drop box at the rear of the transmission lowers the drive shaft 8 3/16 in., adding to the compactness of the overall unit.

Standard wheelbase is 106 in., with nine optional wheelbases ranging from 112 to 226 in. Overall width of the cab is 95.5 in. and overall height to top of muffler outlet is 119 in., when equipped with 10.00 x 20 tires.

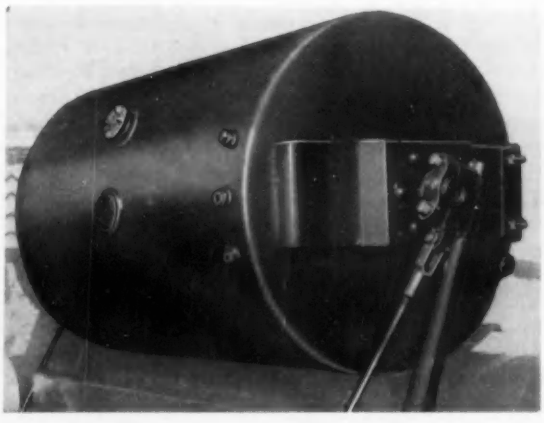
The frame is single channel of chrome manganese steel, heat treated, 9⅛ x 3⅛ x ¼ in. On extremely long wheelbases, White offers an optional frame of single channel chrome manganese molybdenum steel, heat treated, 9½ x 3¼ x 5/16 in.

Standard heavy duty components include a wide track front axle, Model 121D, with 12,000 lb capacity; Model 124C single reduction, full floating rear axle with 18.5-in. ring gear; 14-in. two-plate air-actuated clutch; and the nine-speed transmission. Power comes from Cummins Diesel engines ranging from 180 to 262 hp.

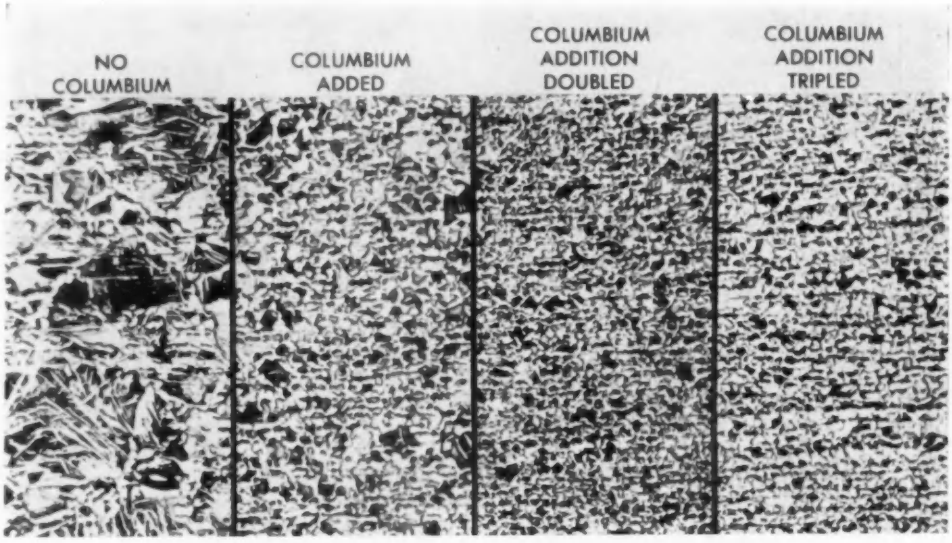
Front springs are semi-elliptic, measuring 52.5 x 4 in., and have threaded eyes and shackles. Rear springs are variable rate cam-type and rubber cushioned, with effective length 60 to 46 in. x 3 in.

White has put new emphasis on driver comfort and driving ease. In addition to the air-assist synchromesh shift, the new 5000 se-

(*Turn to page* 56, *please*)



Center - mounted aluminum fuel tanks are standard on the new trucks



Effect of columbium content on microstructure of low carbon steel

Great Lakes Steel Corp. Introduces New High-Strength Low Carbon Steels

OFFICIALS of the Great Lakes Steel Corp. see a major breakthrough for their new series of columbium-treated, high-strength low carbon steels now in volume production. Developed during the past year to fill the gap between plain low carbon steels and light alloy steels, they were announced to the trade last month and are available in sheets, bars and plates of normal sizes.

Designated the GLX-W series, these new steels are classified in four grades according to their yield strengths. Their symbols are GLX-45-W, GLX-50-W, GLX-55-W and GLX-60-W. The GLX-45-W grade is a low carbon steel with a minimum yield strength of 45,000 psi. Likewise, the minimum yields strengths of the others are 50,000—55,000—60,000 psi, respectively.

Clarence L. Altenburger, technical assistant to President W. D. MacDonnell of the Great Lakes Steel Corp., has submitted the following data for comparing the four new steels to an untreated steel with a carbon content of 0.10-0.15 and manganese content of 0.60-0.80.

	Untreated Steel	GLX-45-W	GLX-50-W	GLX-55-W	GLX-60-W
Yield point, psi	36,580	46,500	54,520	57,760	63,020
Tensile strength, psi	62,260	70,400	73,230	77,940	82,240
% Elongation	44	43	37	35	34
Charpy V, ft-lb:					
—20 F	19.0	20.0	23.0	30.0	—
—40 F	12.5	16.5	20.0	22.0	—

Higher strengths and greater toughness are obtained by balancing the low carbon and manganese contents with various amounts of columbium. At any given carbon and manganese content, by adding columbium it is possible to raise the yield strength as much as 20,000 psi and the tensile strength by 15,000 psi in the low carbon steel ranges, according to Great Lakes Steel officials.

Another example cited is that the 45,000 psi minimum yield strength in that GLX-W grade can be attained at successively lower carbon and manganese content depending upon the amount of contained columbium and hot-rolling practice employed. The effect on grain refinement by adding columbium is shown in the accompanying composite micro illustration.

Unlike with other hot-rolled carbon steels, it was pointed out, the increasing strengths in the GLX-W series do not mean increasing brittleness. With increasing columbium, hardenability decreases quite rapidly within the range used in the GLX-W series. This condition is beneficial for welding and forming.

Possible applications for the GLX-W steels are in earthmoving equipment, haulaway trailers, truck trailers, truck frames, and other heavy duty equipment. For the same strength levels, lighter sections of GLX-W steels could be used and therefore reduce weight. In addition, although the GLX-W steels cost more on pound-for-pound basis than the low carbon steels, with the weight reduction cost savings would result, up to 35 per cent, as shown by Great Lakes Steel figures.

Columbium is found chiefly in oxide minerals such as niobite and columbite. There are large deposits in Canada, Brazil and Africa. ■

2 reasons why engines get more power protection from Perfect Circle

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solve problem of excessive oil consumption past pistons!

P C chrome piston rings are the finest obtainable! Top rings and oil rings are plated with thick, solid chrome. Entire area of ring travel gets complete wear protection, more than doubling life of cylinders, rings, pistons. No tedious break-in is necessary because rings are pre-seated at factory.

SPECIFY P C CHROME RINGS for thousands of extra miles of power protection with positive oil control!

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New overhead valve engines develop higher compression pressures...and higher deceleration vacuum. Increased vacuum draws oil through loose or worn valve guides. Avoid this oil loss with new Perfect Circle Valve Seals!

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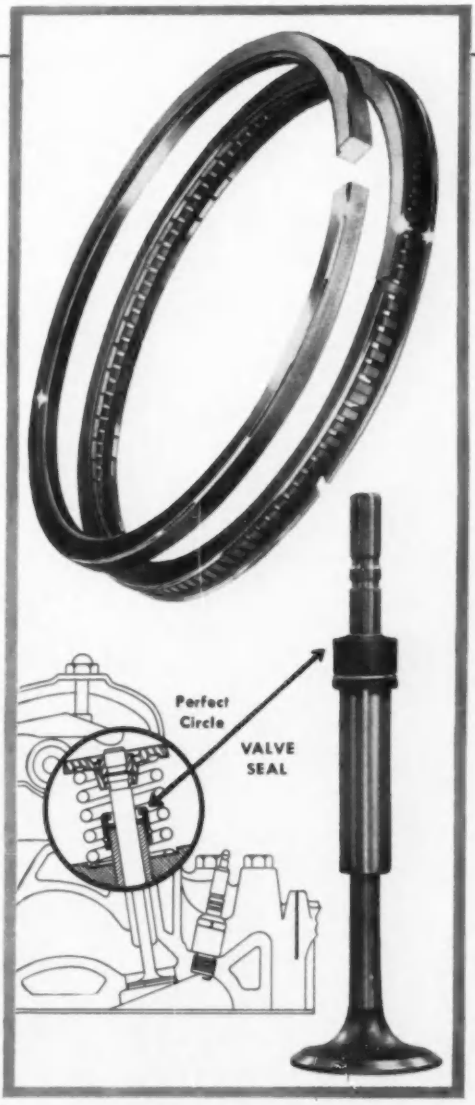
Visit us at the SAE Annual Meeting and Engineering Display, Sheraton-Cadillac and Statler Hotels, Detroit, Michigan, January 12-16, 1959.



PERFECT CIRCLE

PISTON RINGS AND POWER SERVICE PRODUCTS

Hagerstown, Indiana — Don Mills, Ontario, Canada

AUTOMATION NEWS REPORT

AUTOMATIC CONTROLS

PRODUCTION—VEHICLES—AIRCRAFT

By Samuel Cummings

TABLE COUNTERACTS EARTH'S ROTATION

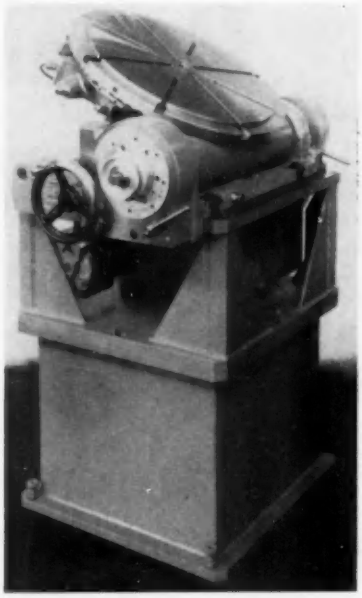
A special tilting rotary table that counteracts the earth's rotation has been developed by Pratt & Whitney Co., Inc.

The table is designed to test gyroscopes under conditions similar to those that would exist on a stationary platform out in space.

The new table rotates in the direction opposite to the earth's rotation at an angle correlated to a selected star's path and at a rate of speed based on intervals in the sidereal day.

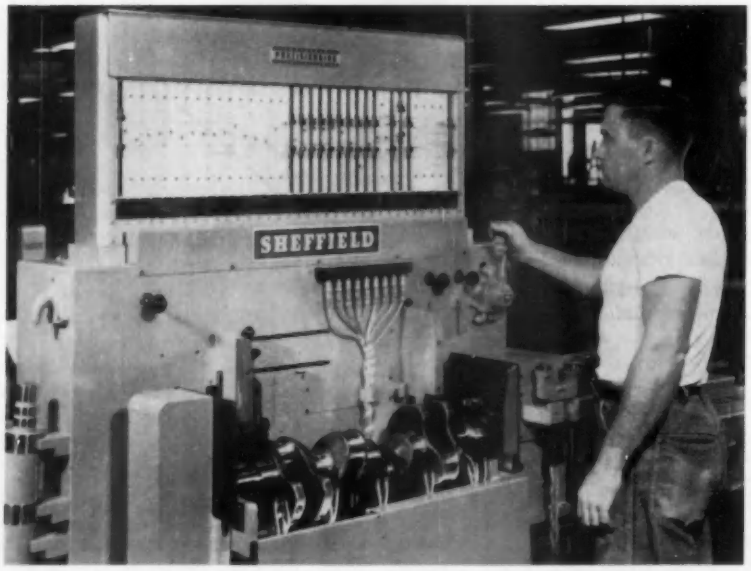
The table is equipped with an Electrolimit measuring system, which established five-degree intervals in the sidereal day and passes this information on to a computer.

Here is the way the measuring system works: Lugs spaced five degrees apart are mounted on the rim of the table. As the table rotates, a sensing head picks up the magnetic center of each lug and sends an output signal to the computer equipment, which sets up the machinery for calibrating the gyroscope.



New Pratt & Whitney rotary table counters earth's rotation

The cabinet on which the table is mounted positions the table at the most efficient working level and also houses the two synchronous motors and the gear box that rotates the table at the desired speed.



SHEFFIELD GAGE INSPECTS THREE DIFFERENT CRANKSHAFTS

Operator checks three different sizes of Diesel crankshafts on this Precisionaire gage designed and built by Sheffield Corp. Previous gages could check only a single crankshaft size. As long as the floats in the 34-column instrument are within the minimum and maximum tolerance lines shown on the chart, the part is the right size. All the Big Three car makers are now using these gages, according to Sheffield.

DYNAMOMETER CONTROL SYSTEM

A new dynamometer control system that simulates inertia electrically instead of by flywheels is now in use at the Oldsmobile Div. of General Motors Corp.

The new system was designed and built by General Electric Co.'s Industry Control Dept. to run performance tests on new cars.

Previously, Oldsmobile engineers started with a base car weight of 4400 lb and by adding 200-lb flywheels could duplicate weights up to 5800 lb. This meant, of course, that accurate tests could be made only in increments of 200 lb.

With the new system, the test engineer can adjust the potentiometer for any weight without leaving the driver's seat. Other advantages are that it cuts setup time for chassis tests, and allows engineers to simulate any degree of grade and to control accurately temperatures

(Turn to page 76, please)

ELECTRIC FURNACE STEELS

BEARING QUALITY · AIRCRAFT · PISTON PIN QUALITY · ELECTRIC FURNACE ALLOY · ELECTRIC FURNACE CARBON · ALLOY BASE ALLOY · QUALITY CARBON

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* Inland Ledloy License

NEW PRODUCTS & FACILITIES CATALOG

Describes melting, rolling, thermal treating and finishing capacity of Copperweld's Aristoloy Steel Division. Complete product listing for Aristoloy carbon, alloy, stainless, leaded and nitriding steels. Send for your copy today.

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METALS

Steel Shipments Lag Slightly Below Rate During October. Excellent Demand for Zinc and Copper

By William F. Boericke

Steel Demand Levels Off

At mid-November it appeared that steel demand had leveled off at about 75 per cent of capacity, after a long rise from 47 per cent registered last spring. Optimism that the rate would climb into the 80's was tempered by continued slow demand from Detroit, where there is still some doubt of how well the new models will meet public approval. Buyers refuse to become stampeded into ordering steel beyond their normal needs. They are fully aware that with operations at the present rate in the steel mills, there remains ample capacity to care for any upsurge in demand.

It now appears that November shipments will lag slightly below October, which was the best month of the year, because of a seasonal dip in shipments of tin plate and delayed automobile buying as a result of sporadic strikes across the country. Other factors affecting the market are continued slow demand for heavy steel products, notably structurals, pipe and oil country goods.

On the brighter side is the good demand for flat rolled products, including cold rolled sheets, and especially galvanized sheets, which have been a bulwark of the market. Some mills are closed out on deliveries of galvanized products for the balance of the year and are accepting orders for January and February delivery. *Iron Age* points out that a pickup in structurals is long overdue. This could be stimulated by a step-up in railroad buying for sadly deteriorated freight cars. Similarly, demand for line pipe should improve regardless of the Court's delay in rendering its decision on the Memphis case. If this is regarded as favorable, it could result in a surge of orders and create a really tight situation in oil country goods.

Inventories Now Normal

As yet there has been no general build-up of steel inventories. Consumers are not worried over longer delivery time on orders. However, in the opinion of the U. S. Steel chairman, inventory liquidation has been completed, with a reduction of 10 to 12 million tons over the last 15 months. As a result, shortages in particular products could develop in the early future although not existing in the steel situation as a whole.

Somewhat disturbing has been the sharp reversal in the normal excess of exports of steel products over imports. During the year exports to Europe have slumped, while imports gained. On the west coast, Japanese plate has been offered much below domestic quotations. The decline in steel activity in Great Britain and West Germany is given as a prime reason for lower exports.

Stainless Demand Improves

Shipments of stainless steel, hard hit in the recession, have improved at a faster rate than steel as a whole, and now total 70 per cent as large as a year ago, compared to 68 per cent for all steel products. A relatively new high record was made for the 200 series, in which manganese replaces part of the nickel content. There was also a gain in the 300 series, nickel-chromium, at the expense of the 400 series (no nickel). No doubt this reflects in part the surplus of nickel now available, in contrast with short supplies a year ago. Demand for tool steel continues spotty.

Scrap Market in Doldrums

There is no joy with the dealers in scrap. The market for scrap is easy and the price remains virtually unchanged from week to week. Pittsburgh mills remain out of the market. In spite of the marked rise in the steel operating rate in the third quarter, there was no corresponding movement in the scrap market. Nor has there been any export demand. Dealers declare that a steel rate above 80 per cent is needed before any improved demand for scrap will be seen, and declare that higher blast furnace efficiency, world-wide disappearance of scrap shortages, and use of hot metal in steel making, have made business poor for their industry. Little hope is extended until 1959. It would appear that the heretofore time-honored price of scrap as a barometer of steel activity has lost its significance.

Copper in high demand

The extraordinary improvement in the copper situation is made abundantly apparent with publication of the October statistics of the Copper Institute. Domestic deliveries climbed 23,600 tons in the month to total 121,700 tons, the highest since June, 1956. During the same time foreign shipments reached a record of 171,700 tons. As a consequence producers stocks in this country dropped nearly 50,000 tons at the end of October, the lowest since January, 1957, to total 128,500 tons. This represents a decline of about 125,000 tons in the

(*Turn to page 56, please*)

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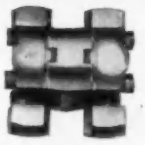

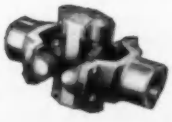

MECHANICS makes Roller Bearing UNIVERSAL JOINTS for every SIZE and TYPE of tractor, as well as for farm machines of all kinds. From the largest to the smallest application, MECHANICS Roller Bearing UNIVERSAL JOINTS transmit the maximum torque capacity of the engine with a minimum of lost motion. Joints can be removed and replaced—on the road—in 15 minutes—with a hammer and screwdriver. Let our engineers show you how MECHANICS Roller Bearings UNIVERSAL JOINTS advantages will help win preference for your machines. Send for catalog.

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METALS

(*Continued from page 54*)

five months since May. Not to be outdone, foreign stocks dropped 56,300 tons in October and were the lowest since March, 1953. On a world basis stocks were reported to be the lowest for more than two years.

Copper sold at 32½cents a pound early in November on the London Metal Exchange reflecting the squeeze on speculators who had miscalculated on the tonnage lost by the Rhodesian strike. As a result this country reversed its traditional role and became an exporter of copper abroad. With the arrival of American copper in London pressure eased on L.M.E. and the price declined to about 30 cents or to our domestic level.

The pipe line from Rhodesia to London is empty at the moment, and it will need 60-90 days before copper is again flowing normally, but it is on its way. The end of the Rhodesian strike will see all effort abandoned on curtailment and this with announcement of capacity of operations at most of U. S. mines should result in adequate supplies to meet present and anticipated demand. In short, there is no reason to expect a copper shortage or any advance in the price above 30-31 cents a pound, barring further strikes.

Even at the height of London's frantic scrambling for spot copper, metal for 90 day delivery was offered for substantially less, and this still continues. Yet it is quite possible that the domestic price may advance so as to establish the normal differential of 2½ cents or 3 cents over London to compensate for the tariff and shipping costs. Domestic producers are by no means anxious to see copper take off to prices higher than 31 cents which is regarded as a danger point that would cost loss of markets to aluminum and other competitive materials. The leading U. S. producer declares its output has been sold for a month in advance. However, the price of scrap, usually a good price barometer for electrolytic, has been wavering at the 24½-25 cent level.

Zinc Industry Cheered by Excellent Demand

Like copper producers, zinc men had solid ground for optimism in the publication of their figures by the Zinc Institute. Domestic shipments rose above 93,000 tons for the month, the highest figure for 1957-58. This was a 100 per cent increase over low water mark last April of 46,600 tons. Stocks of slab zinc held by smelters had declined to 210,000 tons at the end of October, a 19 per cent reduction of 48,000 tons from the record 257,900 tons in stock at the end of July.

It is not surprising that the zinc price was advanced another half cent a pound by mid-November to bring it to 11½ cents. A further advance can be anticipated. The present 11½ cents is definitely a low price for zinc which averaged 13.3 cents a pound in 1950-7. The stabilization price under the Seaton Plan was 12¾ cents while the Senate set 13½ cents. These prices represent the considered opinion of Government and trade experts for a level that would permit domestic mines to operate at a fair profit.

In London, for the first time in many years, zinc has sold higher than lead. Demand has been strong both here and abroad and it is significant that instead of weakening in London, when quotas were announced, the price strengthened.

Zinc strength can be ascribed to the heavy call made by the galvanizers, now one of the most active factors in the steel industry. Diecasters are not far behind in demand for the Special High Grade metal and the brass industry is beginning to report better business hence more need for zinc along with copper.

Lead Price Steady

Demand for lead does not appear so strong as for zinc although the 13 cent price is firm. Smelters and refiners stocks of lead dropped slightly in October for the first time this year. However, stocks were still very high compared to a year ago. ■

Report from the FARM EQUIPMENT INDUSTRY

(*Continued from page 41*)

moisture conditions are generally good.

This summer we introduced a completely new line of tractors. In addition, our "off-farm" tractor business, which proved to be the bright spot in our 1958 tractor business, should continue to grow. The second source for the expected increase in sales volume is farm implements.

Oliver Corp. has announced a conditioner as an addition to its hay tools line. Metal rolls 80 in. wide, powered from the tractor, crimp plant stems at two-inch intervals to expose inner moisture for fast, uniform drying, minimizing leaf loss and safeguarding quality nutrients of alfalfa, clover, and other hay crops.

Another hay tool was the three-wire baler, capable of handling 20 tons of hay per hour. The 16 by 23 in. baling chamber is equipped with automatic four-way hydraulic tension, and bales of any length from 20 to 50 in. can be produced. The baler, designated the Model 101, has a 60-in. pick-up width, and hydraulic control of the pick-up chamber. It is powered by a 36-hp aircooled engine. ■

White's New Trucks

(*Continued from page 49*)

ries offers optional power seats, window lifts, vent windows and steering. Air conditioning also is available as an option.

Two sleeper cabs are designed for hauling 40-ft trailers in 50-ft states. Model A has a 23-in. bunk in a cab with 72-in. BBC dimension, and Model B has a 31-in. bunk in an 81-in. BBC cab.

The power tilt cab is of the type introduced on the White 3000 several years ago. New, however, is the access door panel in the cab front to permit daily service functions such as oil check. The aluminum grille is removable for quick radiator servicing. ■

"WEIRKOTE'S ZINC COATING STAYS SKINTIGHT. NO PEELING OR FLAKING—CAN ELIMINATE DIPPING OR PLATING AFTER FABRICATION!"

Q. Sure, but what happens on the tough jobs—like deep drawing or crimping?

A. You can work Weirkote right to the limit of the steel itself. And as I said, no peeling or flaking.

Q. Then where's the miracle? We tried galvanized before. And it struck out. Too much trouble, too much cost fixing it up after fabrication.

A. No miracle. It's just that Weirkote's made by the continuous process which integrates zinc and steel so that the toughest fabrication won't break down the bond.

Q. That means then that Weirkote can eliminate the need for plating or dipping to assure uniform corrosion protection for the most intricate part . . . is that the picture?

A. Yes, that's exactly the picture . . . and with Weirkote you can free a lot of the capital, floor space and time you have tied up in plating operations.

Send today for free booklet that details the time- and cost-saving advantages of using skintight zinc-coated Weirkote. Write Weirton Steel Company, Dept. T-8, Weirton, West Virginia.

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News of the MACHINERY INDUSTRIES

World-Market Competition and Defense Capabilities of Machine Tool Industry, and Plans for 1960 Machine Tool Exposition Discussed at Annual Meeting of the NMTBA

By Charles A. Weinert

Importance of Machine Tool Industry to Defense Stressed at Annual Meeting of Association

Foreign competition on machine tools is now serious, and could become critical. Machine tool productive-capacity in this country has declined. It conceivably can bog down—unless corrective measures are promptly taken. The defense capability of the United States is at stake.

These adverse factors were impressed on those attending the 57th Annual Meeting of the National Machine Tool Builders' Association at Hot Springs, Va., Nov. 5-7. About 350 executives from the machine tool industry, Government, and product-manufacturing companies participated.

The three-day program was well-rounded. Subjects discussed ranged from world-market competition and defense—to domestic-market prospects, Governmental activities, problems and replacement policies of machine tool users, and plans for the 1960 Machine Tool Exposition.

Defense Aspects

In a talk entitled "Unpreparedness for Defense," Alfred V. Bodine—1958 president of the NMTBA, and president and treasurer of The Bodine Corp.—contended that our present ability to produce machine tools is at a level far below that needed for the country's safety.

The major portion of the decline has stemmed from the drop-off in domestic buying. However, more and more foreign-built machine tools are being purchased in the United States. (For example, radial drills imported last year were equivalent to 48 per cent of the radial drills built by American companies.) And more American builders, in order to meet price competition arising from the low wage scales prevailing abroad, are themselves putting plants in Europe. This, in turn, transfers capacity to the Continent—which is vulnerable to enemy acquisition in case of war.

RALPH J. KRAUT
President-Elect of NMTBA

Factually, sales of U. S. builders this year are down 74 per cent from 1956, 25,000 machine tool employes have been laid off, most plants are operating on a short work-week, and the number of machine tool companies has declined from 403 in 1952 to 367 today.

Mr. Bodine said the concept of some officials that we need prepare only for a quick nuclear war is wrong and dangerous. Conversely, it is probable both sides will be afraid to use atomic weapons—and that any conflicts which may occur will be limited in scope. Consequently, to be properly prepared "we should be ready to produce at a moment's notice the requisite quantities of weapons to be used in limited (non-nuclear) warfare—and this sort of production requires a great many machine tools"

ALAN C. MATTISON
First Vice-President

EVERETT M. HICKS
Second Vice-President and Director

GRAHAM E. MARX
Treasurer

WALTER K. BAILEY
Secretary

JAMES K. FULKS
Director

GRAYSON M. STICKELL
Director

produced by a high level of machine tool capacity.

The speaker outlined several recommendations made to Government for "arresting and reversing the continuing decline in U. S. machine tool production and capacity." These dealt with: The increasing inroads of foreign builders who, with their low wage rates and under prevailing tariffs, can sell machines in the U. S. at prices substantially below those quoted by domestic builders; Defense Department purchase of an increasingly large share of machine tools from foreign builders; International Cooperation Administration purchase of machine tools for our foreign aid program; (In 1954, 99 per cent of these purchases were made in this country. While in 1958, only 25 per cent were U. S. machine tools—and 41 per cent were bought in Germany.) And, accelerated tax depreciation as a means of encouraging American users to buy new and improved machine tools.

Mr. Bodine reported progress on two situations: He complimented the Governmental Inter-Agency Committee on machine tools on its work in channelling surplus machine tools into the National Industrial Equipment Reserve, and to schools—thus making them available for a national emergency. At the same time, flooding of the market has been avoided.

Secondly, it appears a program will be placed into effect by the Defense Department for replacement of obsolete machine tools located in defense facilities. For that purpose, about $41 million has been appropriated for procurements during fiscal year 1959.

In conclusion, Mr. Bodine said, "Is our industry, enmeshed in the web of reciprocal trade and low foreign wage rates, to go the way of watches and bicycles? Or is it, like shipbuilding and aircraft, to be regarded as a vital arm of national defense, and its capacity maintained accordingly? That is a question confronting Washington today."

World-Market Competition

Current uneasiness about competition with the Western European machine tool builders is dwarfed by a new threat—the rapidly-growing Russian machine tool industry.

Ludlow King, executive vice-president of NMTBA, quoted figures indicating the USSR is presently making machine tools at the rate of 140,000 per year (versus our 34,000)—and expects to increase production to 200,000 units by 1960.

There is concern that the USSR sale of machine tools will be used as a political instrument for destroying the Free World machine tool industries, and thus the self-sufficiency of the countries involved.

Russia, through her satellite countries, has already started selling machine tools in South America and a few in European countries—at prices one-third to one-half below European-produced machine tools.

His report came out of a conference held at Brussels in September between Association officials and representatives of the machine tool producers in England and the Continent.

Mr. King said that, in general, the machine tool business abroad was off 20 to 25 per cent. England's machine tool production will amount to about $220 million in 1958. West Germany will surpass the U. S. as the Free World's leading producer. Exporting about half of its production, it expects to produce $420 million worth of machine tools this year. Numerically, since the German builders usually sell at about one-third less, the comparable dollar value would be $630 million (compared to our probable total shipments of $480 million). In Italy, machine tool production will amount to $60 million in 1958.

Combined production of the three countries in 1958 will be more than $1 billion (adjusted to U. S. prices), compared to our $480 million. Their export business alone (U. S. price adjusted) will amount to about $450 million. Yet some of the foreign builders have hopes of getting a greater share of our domestic market.

Mr. King concluded, "In the face of such low-wage competition, the health of our machine tool industry is dependent upon two major factors—our ability to out-design, out-service and out-sell cheap-labor countries; and our Government's interest in maintaining a strong machine tool industry."

Governmental Activities

Various activities of Governmental agencies having to do with machine tools were reviewed by Niels A. Olsen, director, Metalworking Div., Business and Defense Services Administration, Department of Commerce. He pointed out that the organizational setup within the department now provided "a single point of clearance in Government" for business men to discuss problems and exchange views.

The speaker said that surplus disposal programs had received much attention during the past year—and, with the help of industry experts, had been carried out in an outstanding manner. He mentioned the rate of disposal will probably be accelerated during the coming year. It is estimated that 20,000 machine tools will be declared excess to military requirements. And that in view of this anticipated expansion of the program, new inspection procedures and instructions were in process of development to improve overall efficiency of operations.

Mr. Olsen told of the work which had been done on the "tools for schools" program—reactivated and enlarged in April of this year. For the first time, educational requirements for machine tools were developed. As of June 1, 1958, these totaled about 96,000 machine tools and about 13,000 items of related production equipment. Subsequent reviews have indicated little, if any, change in these figures, he advised.

Better methods for assembling and publishing data on imports, as well as on exports, of machine tools are in process. Last year a satisfactory sub-division of machine tool categories for statistical purposes was worked out for exports. The Division is currently working with the Tariff Commission to ob-

(*Turn to page* 60, *please*)

(*Continued from page 59*)

tain a similar classification for import statistics.

Statistics on machine tool operations in practically all of the producing countries of the world are also being assembled, Mr. Olsen added, as a service to industry.

He mentioned that the Division had received inquiries about trading with the Soviet bloc. In this connection, Mr. Olsen said the new positive list, covering items for which validated licenses will be required before export can be made, would be available on November 10.

The speaker stated that the machine tool industry had been requested to assist in a study "to determine the ways and means by which the private sector of the national economy can be more effectively utilized and protected in carrying out the purposes of the Mutual Security Act and in advancing the foreign policy objectives of the United States." He said the Division recommended active participation of industry, and would welcome "comments from individuals, firms, or the Association."

1960 Machine Tool Exposition

Plans for the 1960 Machine Tool Exposition were outlined by William E. Rutz, interim chairman of the exposition committee and executive vice-president, Giddings & Lewis Machine Tool Co.

He opened his talk by saying, "It is high time we focused our attention upon the 1960 Machine Tool Exposition." Later on he supplemented this statement by commenting that it is important the machine tool builders be prepared, in 1960, "to demonstrate to the metalworking executives of the United States that things can be done that were never even dreamed of before." Mr. Rutz indicated that this calls for concentration "upon bringing out new machines at the 1960 Exposition that will make old models as obsolete as the horse and buggy."

The Exposition, the speaker announced, is scheduled to be held in Chicago Amphitheatre during the period September 6 through 16, 1960.

Mr. Rutz reported, "we think space can be offered at the maximum rate of $3.25 per square foot." He explained, however, that various items of cost are still to be determined and that this is not the final exact figure.

Present thinking is to ask member companies, probably in January, 1959, the amount of space desired. Companies will also be asked to forward a check for the number of square feet requested times $1.00 "so we will have assurance you actually mean what you say." When the returns are in, the committee will correlate the space requested with the space available for each company on as equitable a basis as possible.

Following Mr. Rutz' talk, it was announced that Donald H. McIver, vice-president, Industrial Sales, Ex-Cell-O Corp., had just been made permanent chairman of the 1960 Machine Tool Exposition Committee.

New Officers

During the Annual Meeting, the following were elected to office for the Association year 1958-59: **President**—Ralph J. Kraut, president, Giddings & Lewis Machine Tool Co.; **First Vice-President**—Alan C. Mattison, president, Mattison Machine Works; and **Second Vice-President**—Everett M. Hicks, vice-president and general manager, Grinding Machine Div., Norton Co. Graham E. Marx, vice-president and general manager, The G. A. Gray Co., was re-elected **Treasurer.** Walter K. Bailey, president, Warner & Swasey Co., was re-elected **Secretary.**

New **Directors** elected were Mr. Hicks; James K. Fulks, executive vice-president, Ex-Cell-O Corp.; and Grayson M. Stickell, president and general manager, Landis Machine Co.

Ludlow King was re-elected **Executive Vice-President** of the Association. ■

Nickel-plated propeller blades, long used on seaplanes to prevent corrosion from sea spray, are now being used on commercial land-based airliners. The nickel plating protects the steel blades from abrasion and erosion damage caused by gravel and other debris sucked into the propellers during taxiing.

●

Alloy steels containing nine per cent nickel are used in equipment designed to operate at sub-zero temperatures—as low as 320 F—because unlike ordinary steels which tend to become brittle, they retain their toughness at low temperatures.

●

A large proportion of the nickel produced goes into the making of steel alloys such as stainless steels, most of which usually contain about eight per cent nickel.

●

Twenty years ago cars required about 58 feet to stop when the brakes were applied at a speed of 30 mph; today cars can be stopped in only 30 ft—or 93 per cent sooner — while traveling at the same speed.

●

About five billion gallons of aviation gasoline and six billion gallons of jet fuel will be used in the U. S. in 1958.

●

While the world's production of petroleum doubled in the 10-year period from 1946-56, Canada's production was more than 23 times higher compared with her 1946 output.

●

Over 1000 lb of titanium are designed into the Convair 880 commercial jet transport, resulting in a saving of at least 800 lb in the plane's weight.

●

The Soviet Union has a physical area nearly three times as great as the U. S., but so much of it is wasteland that the amount under cultivation is only 17 per cent larger than that in the U. S.

... Results of a Superior Beginning

The countless parts and products made from Roebling high-carbon steel spring wire and flat spring steel have one thing in common . . . their superior quality. This, of course, is related to the inherent fineness of the materials.

The variety in which Roebling offers these spring materials is equally impressive. They are available in hard drawn, hard rolled, annealed or soft, tempered or untempered. Types include zigzag and no-sag wires; upholstery and mechanical spring wires; valve spring wire; clock- and motor-type spring steels and flat spring steels of all types and description.

Whatever the type, size or characteristics you require—Roebling can fit your needs exactly. You'll find that Roebling quality means maximum production from your machines and consistent uniformity in your product.

For spring wire and flat spring steel information, contact Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

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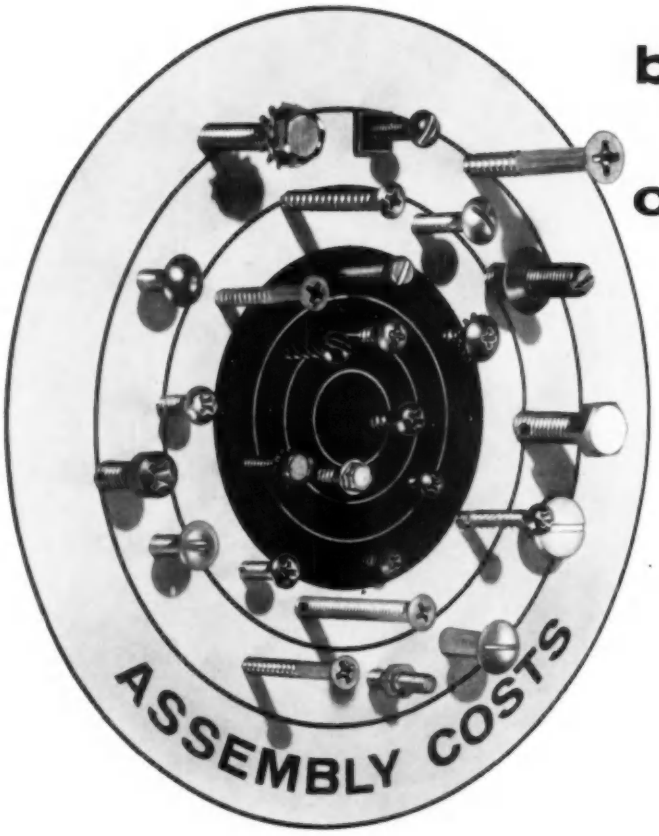

Assembly accounts for up to 80% of the total cost of production. For most manufacturers, it is the biggest target for cost reduction.

If you are missing out on savings you could be making, why not get the expert assistance of Continental Assembly Specialists?

You'll find them ready and able to analyze your fastening operations and offer practical cost-saving ideas. They'll show you why assembly-men everywhere agree, ***"You can count on Continental."*** Write or phone: Continental Screw Co., 451 Mt. Pleasant St., New Bedford, Mass.

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Continental can supply any recognized standard type, style or size. Also, many fasteners ordinarily considered "specials" are available among the millions of screws constantly in stock to meet needs of Continental customers.

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Continental is known throughout industry as the "specialist in specials," — leads in production of special designs. Continental is also your supply source for special-purpose fasteners, such as HOLTITE NYLOK Self-locking Screws.

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With Continental's modern, precision controlled equipment, many special shaped screws formerly machined from bar stock can be produced faster, at lower cost — with higher tensile strength and excellent surface quality.

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Fully-automatic Tape Control, Tracer Control or both. Infinitely variable speeds and feeds. Automatically-maintained, constant-cutting speeds on changing diameters. Console control from moving operator's platform. *Three* hardened and ground ways. Self-contained Motor Generator Set.
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These features include punched tape or magnetic tape controlling: head, table, saddle, horizontal rotary table, vertical rotary table and spindle speeds. For tool room work — for precision production, only Lucas Tape and Tracer Control offers so much flexibility in one machine. Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland 8, Ohio.

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NEW PRODUCTION and PLANT EQUIPMENT

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

Bonding Adhesives

Two new adhesives for cementing bondable Teflon to itself or to other materials have been announced by the Adhesives Dept., Raybestos-Manhattan, Inc. The first, Ray-Bond R-86009, is for applications where some flexibility in the bond is required. It has good resistance to water and most chemicals. The other, Ray-Bond R-86044, features resistance to acids (except acetic) and various other chemicals, as well as water.

Circle 40 on postcard for more data

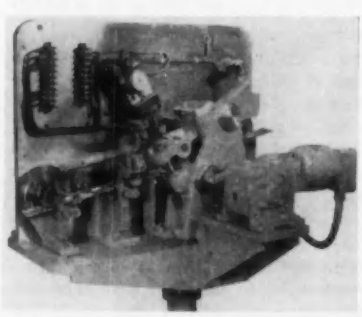
Load Stabilizer Device

A LOAD stabilizer attachment for use with a line of fork lift trucks has been designed for all types of loads that cannot be nested or tied together. The stabilizer clamps hydraulically atop such loads. It has a vertical stroke of 24 in., ranging from a minimum opening of 40 in. above the forks to a 64 in. maximum. Its clamping area is 34 in. square. All controls for operating the stabilizer are located right in the fork truck's cab. *Lewis-Shepard Products, Inc.*

Circle 41 on postcard for more data

Gear Gaging, Sorting Unit

THIS pedestal-mounted Red Ring automatic gear gaging and sorting machine will check the accuracy of

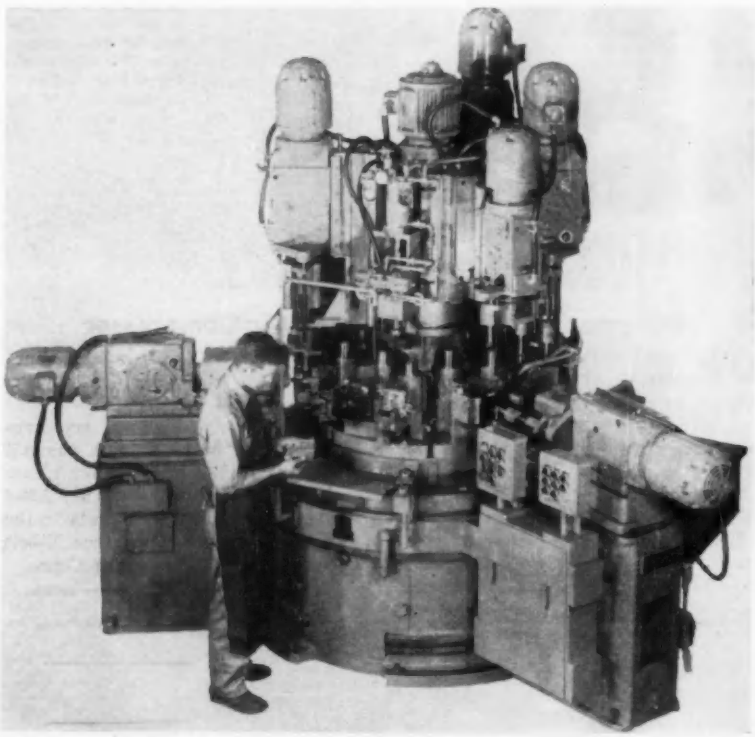


Red Ring gear gaging, sorting machine.

gears with large integral flanges produced by hobbing, shaping or shaving operations. It inspects unwieldy gears having integral flanges which cannot be fed through conventional feed chutes.

The flanged gear rolls through the gage on a guide rail that supports the gear on the hub surface between the gear and the flange. Another guide rail behind the gear bears on the flange surface and keeps the gear upright until it is engaged by the master gear. *National Broach & Machine Co.*

Circle 42 on postcard for more data



Kingsbury multi-unit automatic performs 22 operations on valve bodies.

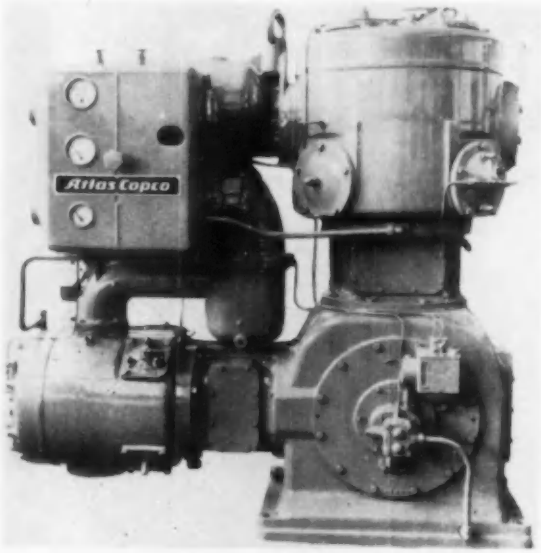
Multi-Unit Automatic Performs 22 Operations

THIS Kingsbury multi-unit automatic with center column performs 22 operations on valve bodies for automatic transmissions. Seven units drill and tap in two chuckings of the work at a gross rate of 330 parts per hour.

A 43 in. index table holds six double-chucking work fixtures with power clamping and automatic unclamping. In each chucking the work is vertical and located against the same milled face. Clamp members hold the part against positive locating plates, clamping outward in the first chucking and inward in the second. At the loading station an air cylinder depresses vertical rams that actuate the clamping members for both chuckings.

Five vertical units on the center column drill 12 holes and tap two of them. Two horizontal units on knees drill eight holes. Six of the units have multi-spindle auxiliary heads. Bushings guide 17 of the 20 drills for positive location. *Kingsbury Machine Tool Corp.*

Circle 43 on postcard for more data



Atlas Copco AR-4 intermediate size stationary size air compressor delivers up to 835 cu-ft of air pressure per minute at 100 psi. It can be operated as a skid-mounted unit as well as an easily-installed stationary machine. The AR-4 stands 6½ ft high, is 5 ft. 5 in. deep and 38 in. wide.

Intermediate Size Stationary Air Compressor

DESIGNATED as the AR-4, this intermediate size stationary air compressor delivers up to 835 cu-ft of air per minute at 100 psi. The unit, weighing 5610 lb, is designed for heavy-duty, three-shift operation and is made of Swedish steel. The AR-4's operating speed is 450 rpm.

The units feature L-shaped, two-stage, double-acting, cross-head design and incorporate vertical low pressure and horizontal high pressure cylinders. Cooling water consumption is 850 gph.

Designed for working pressures ranging from 50 to 125 psi, the AR machines may be modified for either high or low pressures. The AR-4 model, like other smaller units in the series, is equipped for either V-belt drive or direct drive. *Atlas Copco.*

Circle 44 on postcard for more data

Gardner 2H40L-42 in. precision disk grinder with rotary carrier fixturing.

Precision Double Horizontal Spindle Disk Grinder

THIS Gardner 2H40L-42 in. precision disk surface grinder with rotary carrier fixturing for grinding two parallel sides of valve plates has been added to the Gardner 2H series of precision double horizontal spindle disk grinders.

It is equipped with a horizontal trough loader for feeding parts into the stations of the rotary carrier, automatic face cut mechanism for progressive stock removal, automatic diamond dresser which is automatically actuated after a preselected number of parts have been ground, automatic size control and integral wet grinding system.

The grinder is available with 36 or 42 in. diameter abrasive disks, and with a variety of work carrying fixtures—for grinding metallic or nonmetallic workpieces up to 18 in. in diameter. *Gardner Machine Co.*

Circle 45 on postcard for more data

Thin Metal Fastener

HIGH-STRENGTH load-bearing threads can be put into thin gage sheet metal with low installation pressures by use of the SPS Swage Nut. The female threaded fastener can be firmly anchored in sections as thin as 0.020 in. or as thick as 0.25 in. No special tools are required. *Standard Pressed Steel Co.*

Circle 46 on postcard for more data

Parts-Storing Unit

A HIGH-CAPACITY demand-feed storage unit for pipe fittings or any other similar parts that can roll has been developed by Gear-O-Mation Div., Michigan Tool Co. Designed for use in an automated processing line, the unit will handle three different sizes of pipe fittings though not at the same time—minor and easily made adjustments are necessary to change from one part size to another.

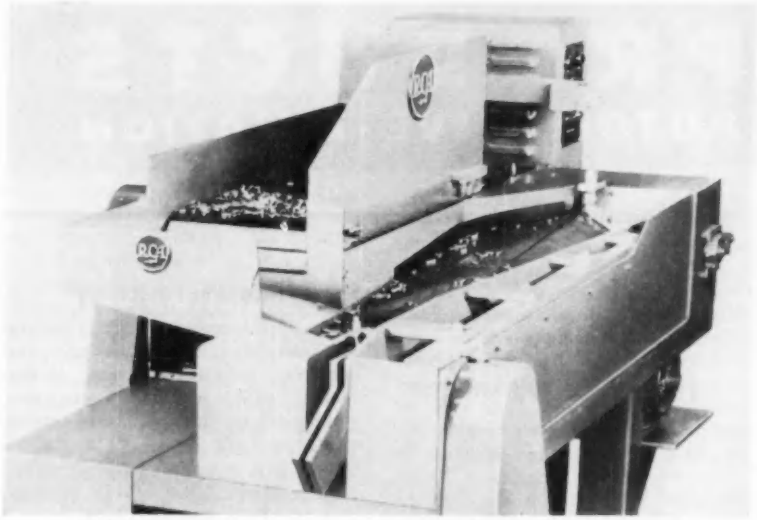
Circle 47 on postcard for more data

Tilt Angle Transducer

AN optical-electronic device has been developed which is capable of automatically detecting and recording angular change to within ¼-second of an arc. Called the Electronic Tilt Angle Transducer, the instrument can be used to measure positional disturbances of structures such as guided missile launching platforms and radar tracking systems.

Used on a launching platform, the disturbance signal from the instrument can be fed directly into a servomechanism to make the platform self-leveling. In addition, the signal can be applied to a chart recorder to graphically illustrate the science of angular measurement. *Keuffel & Esser Co.*

Circle 48 on postcard for more data



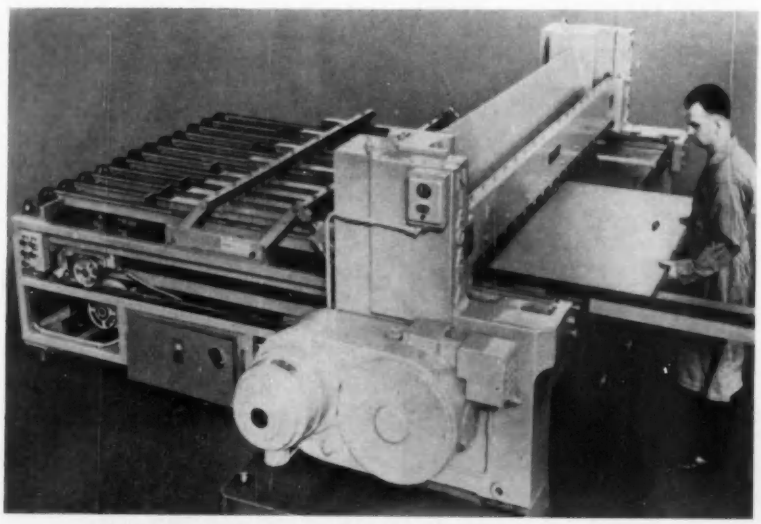
RCA Model 330-NM non-mar feeder for handling fragile, highly finished parts

Non-Mar Feeder For Fragile, Highly Finished Parts

MODEL 330-NM non-mar feeder automatically orients and feeds such parts as wrist pins, hydraulic valves and plungers, bearings, glass or ceramic insulators at speeds of up to 30,000 pieces per hour. Parts handled can be flat, round disks or rings, cylindrical or rectangular in shape.

Demand feed control assures smooth continuous flow of parts to the equipment being fed, whether single or multiple. *Radio Corp. of America.*

Circle 49 on postcard for more data



PAS Shear-Pacer unit handles sheet coil or strip stock from standard sheets

Automatic Unit Gages, Feeds Sheet, Coil Or Strip Stock

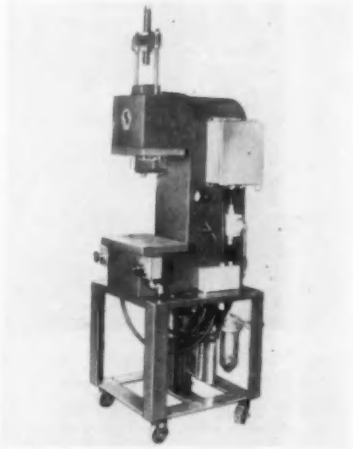
A HIGH-SPEED automatic unit that gages and feeds sheet, coil or strip stock from standard square sheets to provide automatic trim or cutoff operations has been announced by Press Automation Systems, Inc.

Called the Shear-Pacer, the unit is mounted at the rear of a standard square shear and its electrical control system integrated with that of the shear. One operator can feed either sheet or coil stock to the shear. The unit automatically advances the sheet to gaging fingers, operates the shear and carries the trimmed sheet to a stacker unit. Stock feed rate is adjustable from 80 to 300 fpm. When coil stock is being handled, a hump table unit is provided to operate in conjunction with the Shear-Pacer which feeds the stock continuously from the coil cradle.

Circle 50 on postcard for more data

High-Speed Press

POSITIVE ram speed and stop control with no overtravel are features of a new air-hydraulic high speed pro-



Studebaker high-speed production press

duction press. Ram pressure is adjustable from 2 to 12 tons with identical speed cycle. No cooling water is required regardless of cycle speed. *Studebaker Hydraulic Products Co.*

Circle 51 on postcard for more data

Quick-Tilt Spindle

A QUICK-TILTING device for creating wheel clearance on vertical-spindle rotary surface grinders is announced by Mattison Machine Works. This feature makes it possible to convert from rough to finish grinding in seconds so advantages of both high stock removal and flat grinding can be realized on every job.

Circle 52 on postcard for more data

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FOR ADDITIONAL INFORMATION, please use reply card at back of issue

Aircraft Filter

This unique filter, developed by Purolator Products, Inc., performs

vital filtering functions in aircraft hydraulic control systems. Made of specially formed, unitized metal-edge ribbon-type metal, aircraft filters like this had to withstand operating temperatures from 65 degrees below zero to 250 F and a differential pressure across the element of 3000 psi. Flow rate was 0.25 gpm.

Circle 60 on postcard for more data

Blended Plastic Material

A blended plastic material using DuPont's Teflon, named MIPlon, makes use of inorganic additives to the fluorocarbon resin base to achieve improved physical characteristics.

Applications for MIPlon are in mechanical parts, bearings, seals, piston rings, and gaskets, etc., for electrical, automotive, aviation and chemical applications. *Modern Industrial Plastics, Inc.*

Circle 61 on postcard for more data

Flight System Simulators

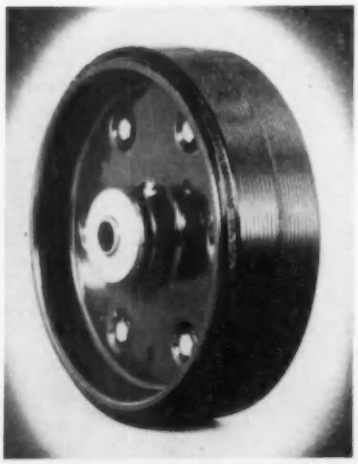
Flight system simulators, or ground-test devices that investigate the flight characteristics of missiles before they are launched permit either individual components or complete controls and navigational systems of missiles to be developed and tested on the ground. They may be used in testing air-to-air, ground-to-air and ground-to-ground missiles.

The equipment includes a flight simulation table and an analog computer. The table is electronically controlled and weighs about 7000 lb. It simulates the three motions of flight. The computer, 7 ft high and 21 ft long, contains about 5000 vacuum tubes and over 12 miles of signal wiring. *Computer Div. of Bendix Aviation Corp.*

Circle 62 on postcard for more data

Demountable Wheel

This heavy duty MB 10 in. by 3 in. demountable rubber-tired wheel has been designed for use on large port-



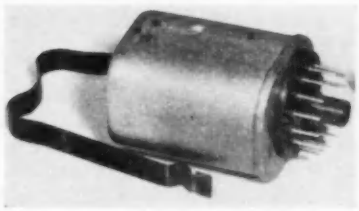
able equipment. A wide based rubber tire, molded to a steel V-back designed rim, brings the capacity up to 1000 lb. At the same time the V-back design keeps the rubber firm and dense under compression for easier rollability under heavy loads. *The Rapids-Standard Co., Inc.*

Circle 63 on postcard for more data

Miniature Relay

Specifically designed for industrial applications such as machine tool controls, welding controls, instruments, and industrial electronic equipment is this miniature sealed, electromagnetic relay.

The unit, exclusive of socket, weighs about 5 oz. It is approximately 1.5 in. deep, 1.6 in. wide and 2 in. high, exclusive of leads and



keyed guide post. Operating time with normal voltage applied to the coil is 25 milliseconds maximum, and the release time is 5 milliseconds maximum. *General Electric Co.*

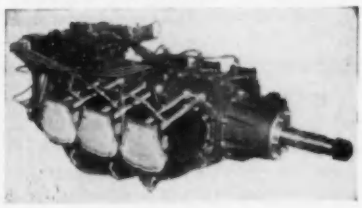
Circle 64 on postcard for more data

Fuel Injection Engine

Designated as the IGSO-480-A1A6, this six cylinder, geared and supercharged engine is designed for utility-type aircraft. It weighs 496 lb, is rated at 340 hp and measures 23.29 in. high, 33.12 in. wide by 47.56 in. long. Fuel grade is 100/130.

The engine is equipped with a Simmonds Type 570 fuel injector featuring automatic altitude mixture compensation. Fuel consumption at 75 per cent rated power is 20 gph. At 65 per cent rated power fuel consumption drops to 17.5 gph. *Lycoming Div of AVCO.*

Circle 65 on postcard for more data



Bonding Adhesive

Successful bonds can be obtained by using Eastman 910 Adhesive, which does not require excessive heat, pressure or the use of catalysts. It will form bonds with almost every kind of material, including wood, glass, cork, felt, leather, cardboard, porcelain, metals and metal alloys, natural and synthetic rubbers, and most plastics except polyethylene.

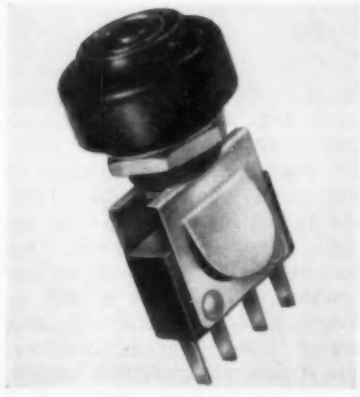
Bonding surfaces must be entirely free of grease and other foreign matter. One drop per sq-in is adequate for smooth surfaces, and best results are obtained when the adhesive is applied dropwise directly from the container to the bonding surface. After application, the second surface should be placed in contact with the adhesive-coated surface and the two parts rubbed together one or two times with light pressure; then final alignment is made. Light manual pressure is then required until the bond starts to set. Total set time will vary according to the nature of the bonding surface. *Tennessee Eastman Co.*

Circle 66 on postcard for more data

Pushbutton Switch

A pushbutton switch engineered for critical space requirements on control and console panels or pendant stations needing splash protection, has been developed by the Licon Switch and Control Div. of Illinois Tool Works.

Heart of the assembly is a Licon Type 16 subminiature switch with



double break contacts—rated at 10 mp., 125, 250 vac or 30 vdc ind. It has a mechanical life of over 20,000,000 actuations and maintains desirable snap action "feel."

Circle 67 on postcard for more data

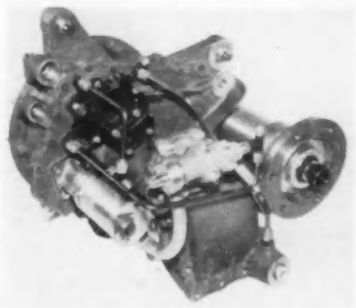
High-Speed Tires

A complete line of high-speed aircraft tires for jet liners has been developed by United States Rubber Co. All the tires are made with nylon tire cord. They are tubeless for lighter weight, cool-running and offer good protection against blowout and are qualified for maximum landing and take-off speeds up to 200 mph, carrying loads up to 35,700 lb each, depending on the size of the tire.

Circle 68 on postcard for more data

Constant Speed Drive

This differential type constant speed drive provides accurate speed control,



high efficiency, low heat rejection and good reliability.

It combines Vickers high performance standard hydraulic pumps and motors with planetary gearing to produce compact and lighter packages. Various power and speed ranges are readily obtained by simply changing the standard hydraulic units. This assures shorter development time and quick delivery. The present size range is from 20 to 90 kva. *Vickers, Inc.*

Circle 69 on postcard for more data

Economical Filler Metal

Curistol, a filler metal, and Curtiflux, a fluxing agent, for low temperature titanium torch soldering have been developed by the Research Div. of Curtiss-Wright Corp.

The Curistol filler metal is a special solder developed for titanium and titanium base alloys. It has a flow temperature between 1300 and 1400 F, depending on the exact composition.

Curtiflux, the fluxing agent, is specifically compounded for low temperature silver solders. It melts about 1000 F and can be heated to 1500 F without decomposing, sputtering, or balling up. It remains translucent at the working temperature of the silver solder, allowing observation of the bonding process. The flux is easily removed with a water-acid dip.

Circle 70 on postcard for more data

Weldable Aluminum Alloy

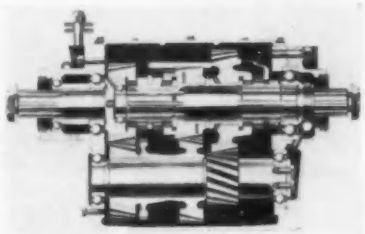
Aluminum alloy 5083 is a weldable magnesium-manganese alloy developed by Kaiser Aluminum. It is suited for a variety of structural applications. In sheet form the alloy is expected to find wide use in applications requiring high resistance to mechanical damage and corrosion, such as processing equipment, marine truck trailers, highway guard rails, and construction equipment. In addition, the sheet offers high strength weldability. *Kaiser Aluminum & Chemical Sales, Inc.*

Circle 71 on postcard for more data

Auxiliary Transmissions

Fuller Mfg. Co. has expanded its line of 3-speed auxiliary transmissions to include a total of 16 units.

Designed for use in the transport,



logging, construction, mining and crane carrier industries, the transmissions are intended to provide a wide range of gearing ratios.

The 92 series pictured is for engines up to 920 cu-in. piston displacement and includes five sets of gear ratios.

Circle 72 on postcard for more data

Molded Plastic Knobs

Molded plastic knobs in nine colors are now available for the complete line of 17 slide switches made by the Electronic Components Div. of Stackpole Carbon Co. They are designed for installation on instruments, small motorized appliances, etc.

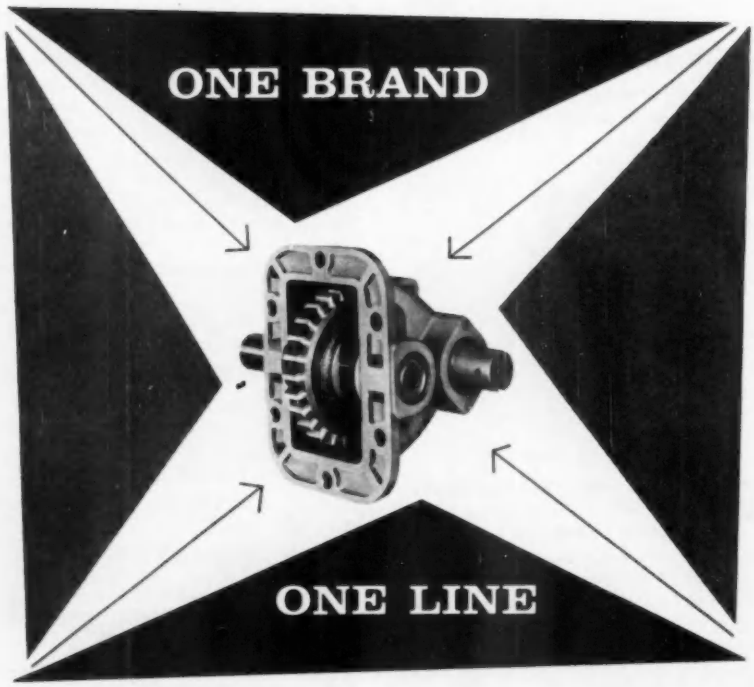
Circle 73 on postcard for more data

Observations

By Joseph Geschelin

Turbine Power

Firebird III gave rise to considerable speculation among newsmen at the Motorama. Does its new and advanced form of gas turbine imply that turbine power is just around the corner? This and other questions came up at the GMC breakfast meeting in New York. GMC's general manager and chief engineer both felt that the practical, commercial gas turbine as a truck powerplant still is a long way off. They touched on something that has bothered us for some time, namely the cost of building such machines. In small lots gas turbines cost around $35,000 at present. Some day in the future some one will have to risk building turbines in large volume before manufacturing costs can compete with the reciprocating engine.



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Tulsa Winch

DIVISION OF VICKERS, INCORPORATED • TULSA, OKLAHOMA

Circle 242 on Inquiry Card for more data

Turbine Progress

Despite the picture with respect to gas turbines, it was encouraging to learn from GM's president Gordon at the Motorama that the Allison division has taken on the turbine project. Allison intends to develop automotive gas turbines initially for application in off-highway trucks and road building machinery. This is all to the good since Allison has been one of the major producers of jet engines and is well grounded both in the design and manufacture of such machinery.

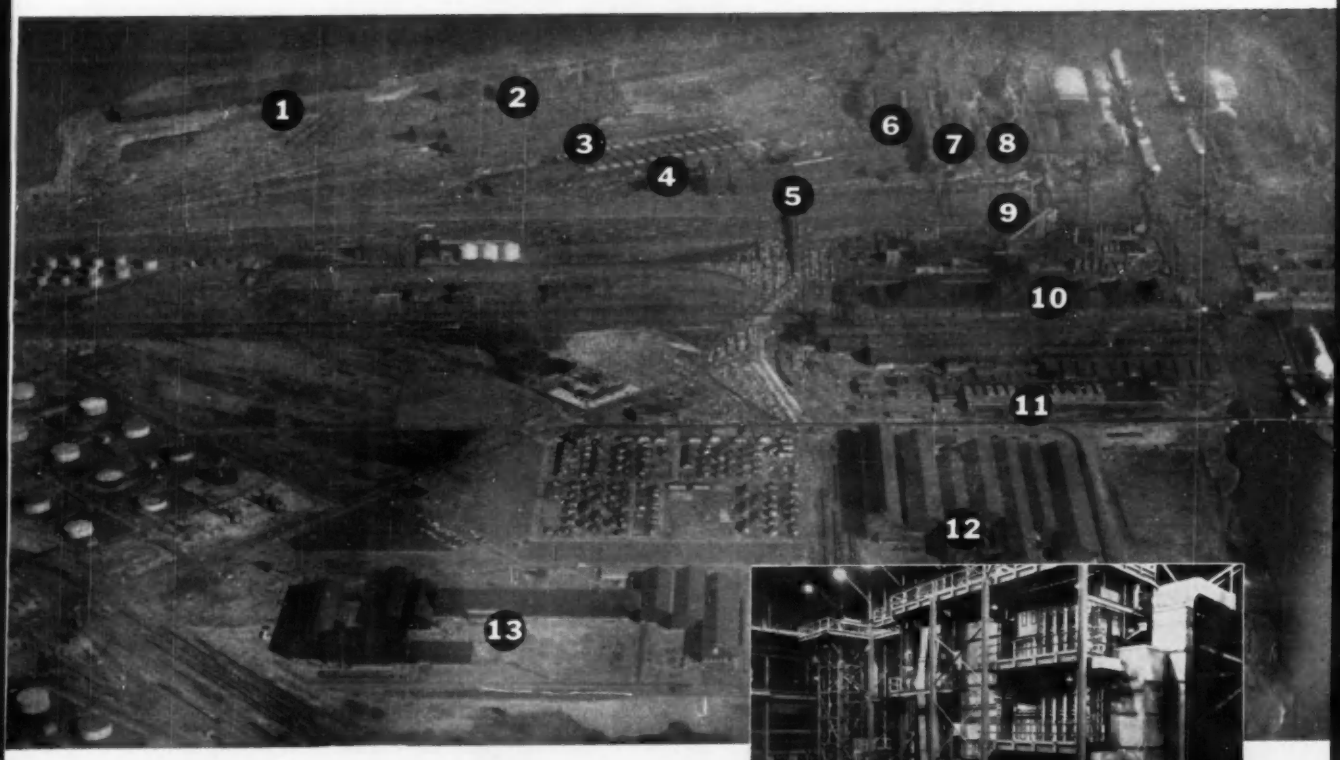
Light Metal

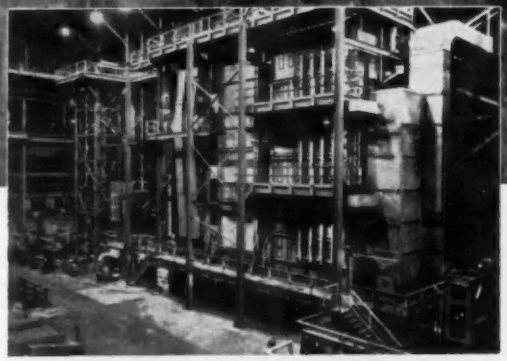
At a recent press conference in Detroit, Reynolds Metals estimated that automotive aluminum consumption would double every five years, reach an average of 200 pounds per car before 1970, and exceed 500 pounds per car by 1980. They characterized this process as a "snowball rolling downhill." The point is that as weight is reduced materially, less engine horsepower is required, less structural strength is needed, brakes can be made smaller, less spring weight will be required. It should result in a smaller, lighter package without sacrificing performance or safety but with increased economy of operation. ■

Birdseye view of the future...

Youngstown's Expansion Program provides more quality steel for Mid-America

The hustle, the feel of the future and the booming spirit of expansion . . . this is the spirit of Youngstown. The birdseye view shows our Indiana Harbor facilities where we are putting this spirit to work in the Chicago area. In addition to our No. 2 Blooming Mill (2), No. 2 Open Hearth Shop (3), Merchant Mill (4), No. 1 Open Hearth Shop (5), Billet and Skelp Mill (6), Continuous Weld Pipe Mills (7), Blast Furnaces (8), Coke Plant (10), Strip and No. 1 Tin Mills (11), the Cold Reduced Sheet Mill (12) . . . our new No. 3 Seamless Tube Mill (1), our new (9) Sintering Plant (construction began in March 1958) and our new No. 2 Tin Mill (13) are shown. These last three expansions are pointed directly at the growing markets of the Mid-Continent. Like the pioneers who made America the great nation it is, Youngstown moves toward new horizons . . . new ways to supply your steel needs through quality products and friendly, efficient service!





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- ☐ Cat. No. 1054A — Young Torque Converter Coolers
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Company .....

Address .....

City ..... Zone ..... State .....

London Show

(*Continued from page* 33)

Sapphire, on show for the first time, retains the basic body shell of the Sapphire 346 but is powered by a larger six-cylinder engine of 243-5-cu in. displacement developing 165 hp at 4250 rpm. Among other mechanical changes are disk brakes in front with servo-assistance on all wheels, integral power steering, and optional automatic transmission with manual override.

Jaguar is also offering more power with a 230-5-cu in. engine for its Mark 9 sedan. This bored-out version of the Mark 8 unit with twin overhead camshafts is rated at 220 hp at 5500 rpm. The latest model is fitted with Dunlop disk brakes on all wheels and Burman integral power steering.

Outstanding among the high-performance cars at Earls Court was the Aston Martin DB4, which David Brown claims can accelerate from rest to 30 mph and stop again in less than 30 seconds. The new twin-cam 224-cu in. engine with 8.2 to 1 compression puts out 240 hp at 5500 rpm. It has an alloy head and block, two S.U. carburetors, and a seven-bearing crankshaft. Disk brakes on all wheels are assisted by the Baldwin Hydro-Booster described in AI of March 1, 1958.

Another new four-seat coupe, the Peerless, has a plastic Gran Turismo body carried on a space frame of rectangular tubing. Powered by the Triumph TR3 100-hp engine and four-speed gearbox, it uses a De Dion-type axle suspended by leaf springs. Twin fuel tanks of 7 gallons each are located on either side of the body to save space in the trunk. This model is expected to be marketed in America for about $3,800.

Despite the declining success of miniature cars in Continental Europe, several small British manufacturers are now probing this field. S.E. Opperman Ltd. introduced the rear-engined Stirling with a 25-hp two-cylinder unit chain-driving the differential. Rear wheels are located by swing axles and radius arms, and independently sprung by Armstrong units com-

(*Turn to page* 78, *please*)

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Circle 246 on Inquiry Card for more data

ON OUR WASHINGTON WIRE

Washington economic planners are alarmed over the public's acceptance of inflation. The reason: Once it dawns on the vast majority that inflation is here to stay, rising costs and rising prices tend to encourage one another much faster.

Dr. Arthur Burns, former Eisenhower advisor, warns: "As more and more individuals come to believe in the inevitability of a creeping inflation, there is always a danger that they will behave in ways that add powerfully to the momentum of inflation and thereby strike at the foundation of the nation's prosperity."

Also, Dr. Burns, says, more and more people are losing faith in the value of the dollar. This is causing more speculation as a hedge against anticipated inflation. Once this idea gets around, Dr. Burns says, "extensive speculation in commodities or real estate or securities will inevitably occur and in time may lead to a general collapse of the economy."

In recent years, leaders in both national political parties denounce inflaton publicly but privately encourage union leaders and management officials to charge all the traffic will bear. Result: Continual bidding up of costs and prices.

Congress in 1959 will be more receptive to pleas for modifying automotive excise tax rates. Taxwriting committees in House and Senate will bulge with Democrats next year. If a labor spokesman such as Walter Reuther calls for a drop from 10 to 5 per cent in the new-car tax, these lawmakers are likely to listen. Car manufacturers, of course, agree with the UAW in favoring cutting or scrapping of the excises.

President Eisenhower is proposing a new style, cooperative foreign aid program, under which the richer countries of the world would form a financial pool to invest in the underdeveloped countries outside the Soviet orbit.

One of the prime beneficiaries of such a pool, the President says, would be the "Colombo Plan" countries of southeast Asia. The new plan, although an adjunct of the existing International Bank, would give the borrower much greater flexibility in repayment.

The President is also calling for expanded international trade, increased exchange of technical skills, increased private investment, and greater use of normal bank credit by underdeveloped countries.

The cost of borrowing money, already up sharply from mid-year levels, is to rise still higher in the weeks ahead. Federal Reserve Board is convinced higher interest is the only way to combat runaway inflation.

NEW! Simpler housing and one-piece bearing reduce maintenance on Thompson Turbocharger

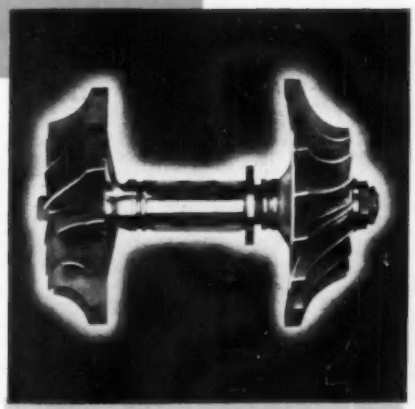
Designed for 10,000 operating hours under the severest operating temperatures and speeds. This means longer revenue runs between scheduled maintenance of the unit, and fewer unscheduled downtimes for repairs.

Turbine housing of the new Thompson Turbocharger is a heat-resistant alloy designed to eliminate corrosive attack and to be free from service cracks. Design also isolates high-temperature exhaust drive from bearing and air-side of turbocharger to increase maintenance-free life.

Bearing is one-piece design, mounted on small diameter shaft to reduce bearing surfaces speed even at high rpm.

Design of impeller supplies supercharging air at equal compression ratios over a larger flow range and at lower rotor speeds than other turbochargers. Light-alloy rotor provides instant response to changes in engine speed and load.

Your blown diesel engines up to 300 horsepower can be readily equipped with new-design Thompson Turbochargers. Our engineers will help. When may they call?



Write today on your company letterhead for Booklet AI-1258 which contains technical data on Thompson Turbochargers for blown diesel engines up to 300 horsepower.

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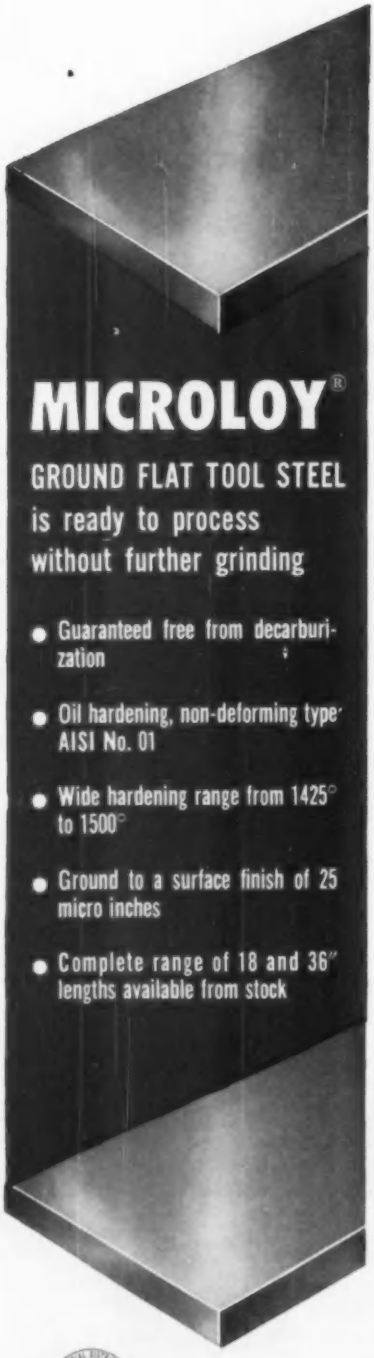
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AUTOMATION NEWS REPORT

(*Continued from page 52*)

and environmental conditions in the laboratory.

Comparison of laboratory test results with proving ground tests show that the dynamometer control is faster, more accurate, and more economical, Oldsmobile engineers said.

AUTOMATIC HIGHWAYS

Tomorrow's highways can be made automatic simply by installing a 2-in. wide strip of stainless steel down each lane. The strip would be "bolted" to the road surface with explosive-powered rivets.

This new technique is proposed by industrial designer John Hauser, who says that the entire Pennsylvania Turnpike could be rigged up for automatic control in only one month.

Cars driving on these highways would be equipped with a magnetic follower system tied into the steering system, plus front and rear sensing devices tied into power brakes and automatic throttle control.

The magnetic follower, according to Hauser, is an electromagnet sliding freely on a rod running across the width of the car. The magnet follows the stainless steel strip and sends out signals to the power steering mechanism.

Both magnetic and non-magnetic types of stainless steel would be used—non-magnetic stainless, containing chromium and nickel, for most of the magnetic follower components and for a shielding beneath the car; magnetic stainless containing only chromium for road strip.

Front and rear sensing devices protect cars against collision. These are small radio transmitters which emit a constant signal. When the signal hits something, it bounces back and actuates either the power brakes or automatic throttle to slow the car down or speed it up.

THINKING MACHINE

A machine that recognizes certain situations as well as humans can—and 15 times faster—has been put together by University of Michigan scientists out of a microscope, TV camera and an electronic computer.

The device is known officially as a "nuclear emulsion scanner," but its inventor calls it "Terry," after Greek "Thereteira," or huntress.

Terry's job is to detect and count the thousands of faint tracks left by atomic particles flying through thick sheets of special photographic film in atom smasher experiments.

The device represents "the first real success among half a dozen attempts to solve this recognition problem instrumentally," according to Prof. Paul V. V. Hough, Terry's inventor.

Terry's eye is the TV camera and her brain the computer. The camera looks through a 200-power microscope at a different tiny square of film every 60th of a second. The brain remembers dots within the squares that are dark enough and wide enough to be parts of a track. If it detects 15 consecutive dots within a square, it records them as one track.

Terry's hands are an electronic printer which keeps a running count of the tracks, and a plotter which draws a graph showing their frequency.

The film strips come from the University's cyclotron, where they are used to record the flight of atomic particles deflected by the nuclei of the atoms in small targets, and sorted by a magnetic field. ■

• • •

The largest automatic fusion welding machine in the U. S.—now in operation at an aircraft company—is capable of running a continuous, perfect weld a horizontal distance of 19 ft. The welding head is electronically controlled and can follow contours within a vertical range of 14 in. ■

For greater selling impact·

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FORMS SEAT and SHROUD

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HIGH-IMPACT THERMOPLASTIC RESIN

HERE'S WHAT CYCOLAC SHEET MEANS TO MOTO-MOWER

The Moto-Mower Division of Detroit Harvester Co. designed a colorful, comfort-molded seat and a lightweight, long-lasting shroud for its Moto-Mower Power Lawn Mower. Replacing costly, heavier metal in these particular applications, Cycolac was greatly responsible for the development of a lighter-in-weight power lawn mower . . . a more economical-to-manufacture, easier-to-sell unit, designed to take severe use and abuse in dependable stride.

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Panelyte Division, St. Regis Paper Company, Richmond, Indiana

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save money

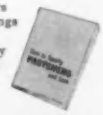
by simplifying fastener design

Here is a simple application of a basic bolt making principle which affects substantial savings.

These savings, resulting from simplified design, are realized in every step of the operation from lower first cost of the fasteners through inventory to final assembly. Totalled, they are well worth while.

There are many other basic principles . . . often overlooked in designing and specifying fasteners, which are of importance cost-wise.

You'll find them in our new booklet, "How to specify fasteners . . . and save". Filled with drawings and charts, it makes a handy guide in designing or buying any headed parts. If you can use a copy, write to North Tonawanda or ask a Field Representative.



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London Show

(*Continued from page* 72)

bining telescopic shock absorbers. The plastic body is reinforced by bonded steel members, and comprises two major moldings joined along the waistline like an Easter egg.

Berkeley presented the "Foursome" derived from its baby sports car that has already won some acceptance in America. The same front-drive layout with a 30-hp engine is used, but the wheelbase is lengthened to 6½ ft to provide room for four persons. The body is of resin-bonded fiberglass braced with light alloy bulkheads and members to form a single rigid structure.

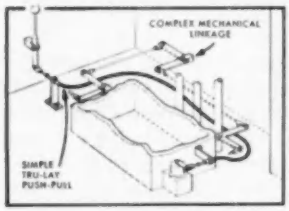
Latest version of the tiny Frisky is the Sprint, for which a power-weight ratio of 110 hp per ton is claimed, and it was stated that the model on show had been entered for the Sebring 12-hour sports car race in March. It has a tubular chassis frame with a three-cylinder 34-hp engine mounted transversely at the rear, with the drive wheels on swing axles sprung by Armstrong telescopic units. Front suspension is by similar assemblies that also act as king pins. The flat, pointed plastic body embodies a center duct carrying cooling air from the front grille to the engine.

Altogether 306 cars were exhibited in London, with the 255,000 sq ft display area making this year's show the largest yet. Auto manufacturers taking part included 33 British, 14 U.S. and Canadian, 7 French, 7 German, and one each from Holland, Sweden and Czechoslovakia.

While the latest models of most of the American makers were shown, Britain represents a very limited market for them. A government-imposed quota restricts imports from the U. S. to 600 cars annually, but even this figure was not reached last year when only 350 were actually sold. High costs are the main reason, for the one-third duty and 60 per cent tax more than double the retail price. Relatively high fuel consumption and lack of right-hand drive on most models are other deterrents.

AUTOMOTIVE INDUSTRIES Goes into Leading Plants in the Automotive and Aircraft Industries

TRU-LAY PUSH-PULL DATA FILE SHOWS HOW TO SIMPLIFY AND IMPROVE DESIGN



Push-Pull remote controls, shown here, are flexible, have but one moving part, and give a lifetime of accuracy. Mechanical linkages are complex, are made of many parts, wear at many points, and produce increased backlash, lost accuracy, and vibration rattles.

This Push-Pull Data File—containing 7 engineering bulletins—will show you how these flexible controls have eliminated mechanical linkages on hundreds of products. You can make *your* products more useful, easier to sell, with Push-Pull controls. Write for your Data File today.

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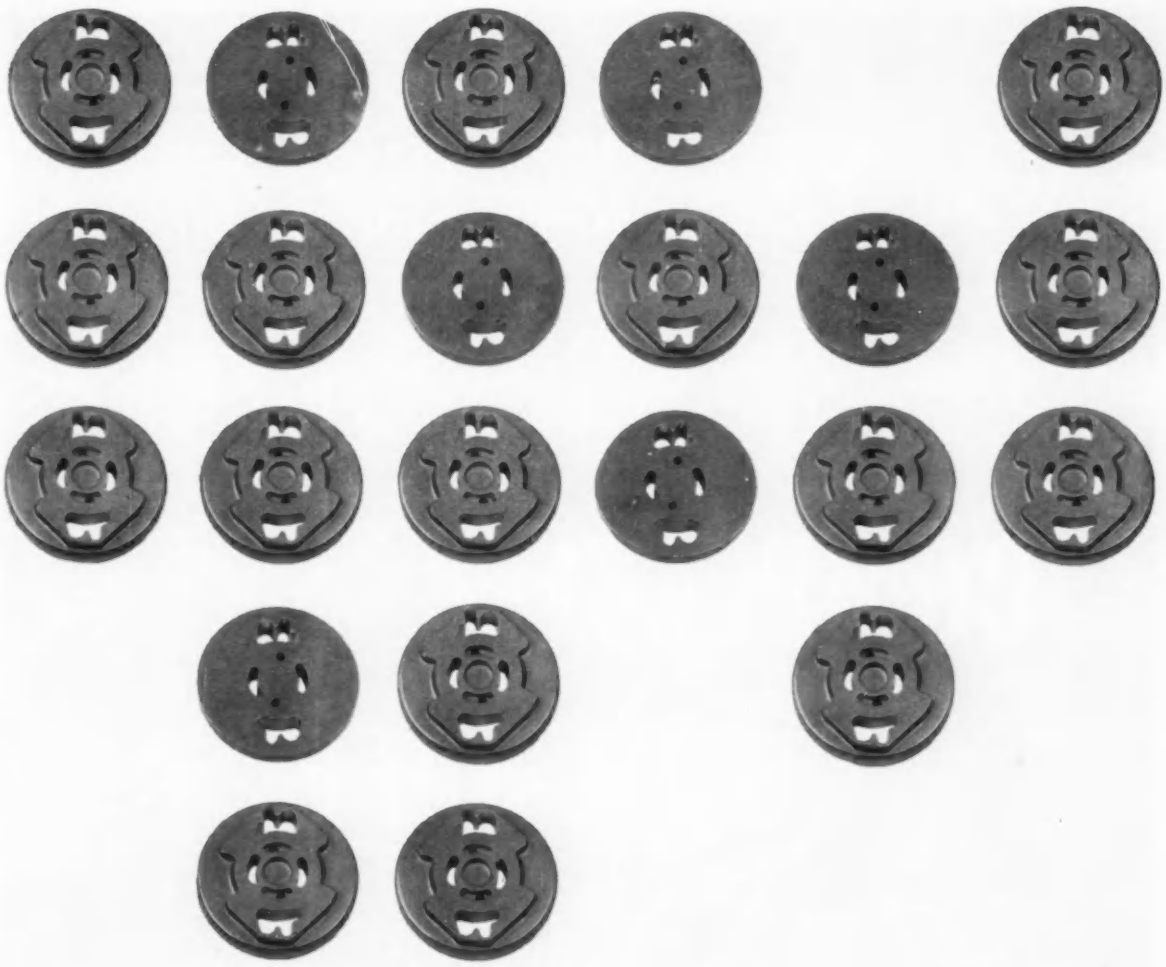

½ actual size

ECONOMY AND DEPENDABILITY are outstanding characteristics of these pressure plates—important components of power steering pumps. These sintered metal parts are in use today because Moraine Products visualized an improved product and developed a workable design. They also demonstrate other Moraine Products' capabilities—making economically, on time, and in quantity, parts that perform dependably under all operating conditions.

Vital parts for Automotive Progress

Moraine Products
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FIRST AND ONLY COMPLETELY FAIL-SAFE FLAME SAFEGUARD

Listed and approved by the Associated Factory Mutual Laboratories and by Underwriters' Laboratories.

The need for protection in gas burner operation has been long recognized . . . and the subject of intensive research.

In 1951, a Honeywell advancement provided a "self-checking" operation at the time of burner startup . . . and spurred the search for full-time protection, because flame-safeguard components can and do fail "unsafely."

Now Honeywell, first again, offers a self-checking circuit that *continuously* supervises all system components. Never before has there been such complete protection . . . *protection you can't afford to be without.* Write for Specification S1015-5.

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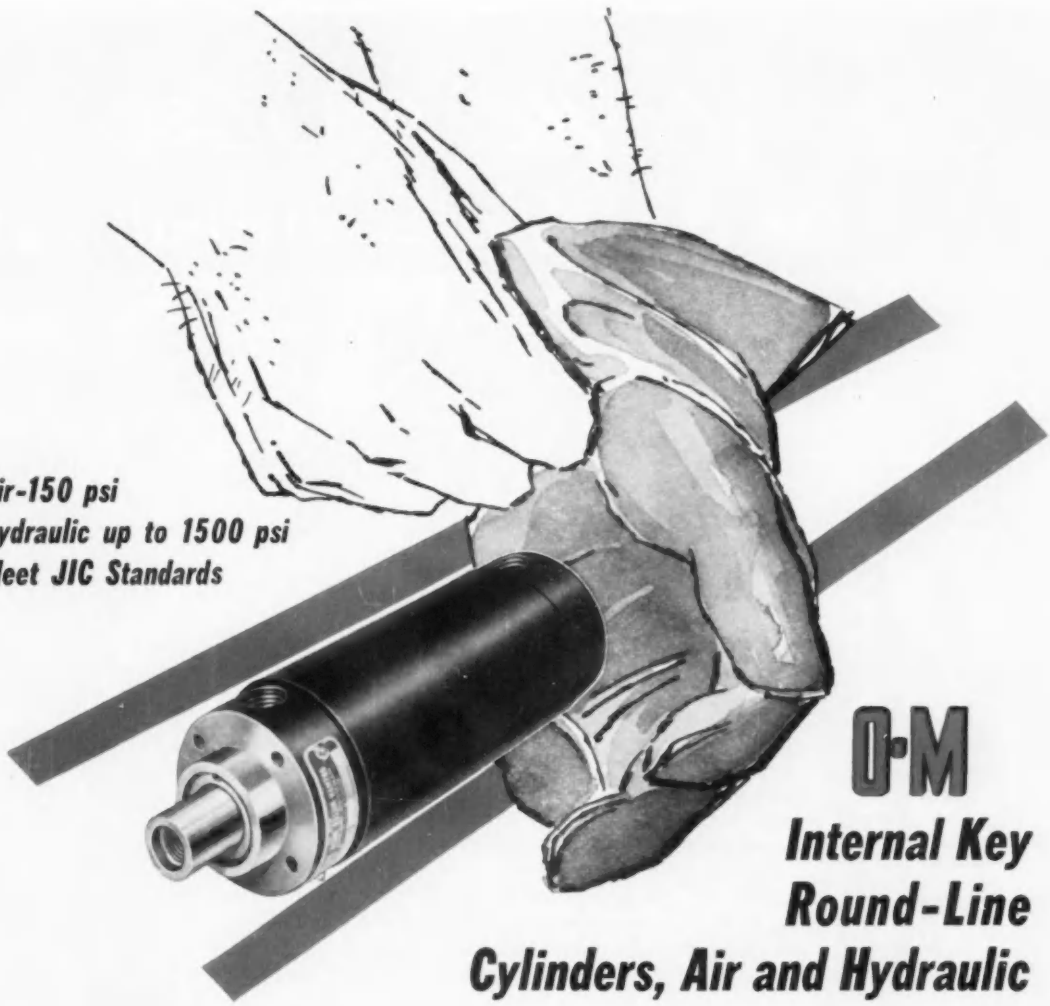
"'A significant technical advancement" . . . at the A.G.A. Convention, Parade of Gas Progress.



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THAT'S why this O-M original Round-line of Cylinders, that fit where others won't, is widely specified by design engineers when space, weight and streamlining are important.

There are other advantages in using these powerful, compact components. For example, they are of all-steel construction with bearing surfaces of bronze, have the lowest coefficient of friction of any cylinder, and deliver continuous, smooth, dependable power at low or high speeds.

In addition, they are simple to install and service. The end plugs are tapped for universal mounting, and the ports can be oriented to any position. These cylinders are quickly and easily modified to fit special applications.

Available in a complete range of sizes (1½" to 8" bores) with standard 2 to 1 or oversize rods. Also full line of mounting brackets interchangeable bore for bore. Immediate delivery on many sizes.

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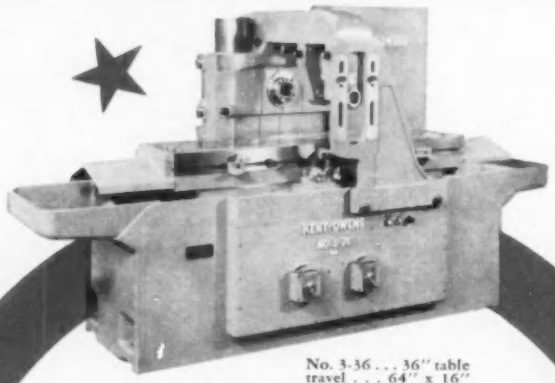
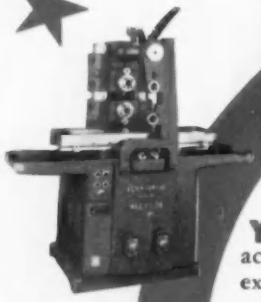
Every one a Star

for speedy accurate milling!



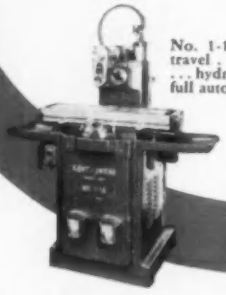
No. 3-36 . . . 36" table travel . . . 64" x 16" table . . . full automatic hydraulic feed.

No. 2-20 . . . 20" table travel . . . 42" x 12" table . . . full automatic hydraulic feed.

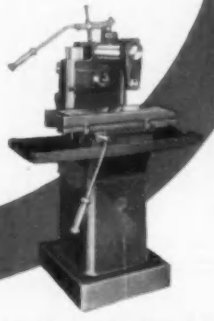


No. 2-20DS . . . Double Spindle for two milling operations . . . 20" table travel . . . 42" x 12" table. Hydraulic feed.

You'll turn out milling jobs with stepped up speed and accuracy with the work on Kent-Owens Machines! These extra-rugged Millers are performance-proved . . . simple . . . versatile . . . practical in every detail. Advanced features throughout! Twin-post head mounting assures balanced load. Only two gear contacts, motor to spindle, means greater cutting efficiency. Check your needs! Write today for bulletins on wide range of hydraulic and hand-operated machines. Also, let Kent-Owens design and build your tooling and special machines. Kent-Owens Machine Co., Toledo, Ohio.



No. 1-14 . . . 14" table travel . . . 32" x 9" table . . . hydraulic table feed . . . full automatic cycle.



No. 1-M . . . Hand feed to table and head . . . 25" x 9" table travel . . . head counter-balance is adjustable.

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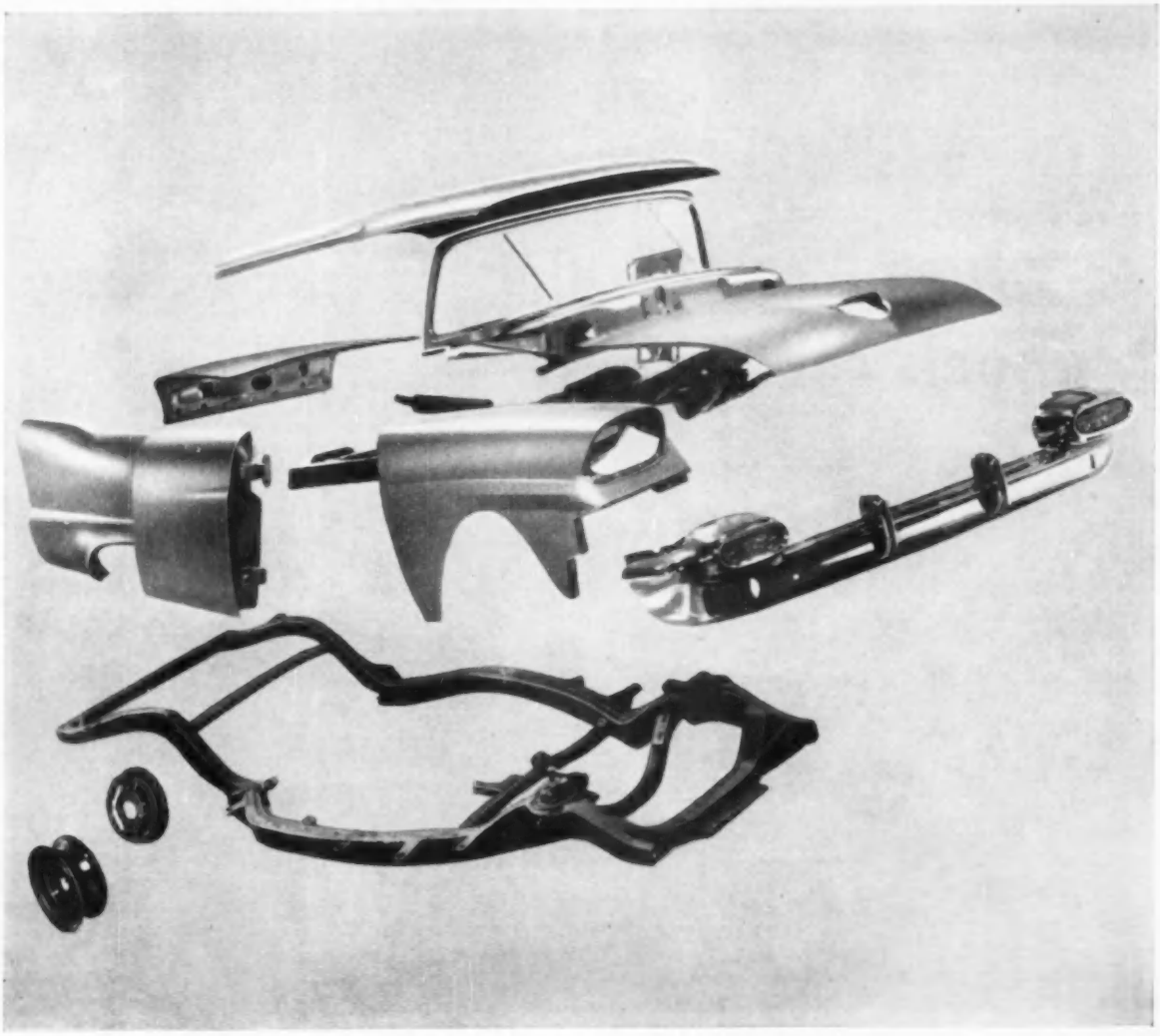

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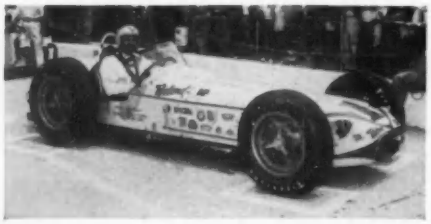
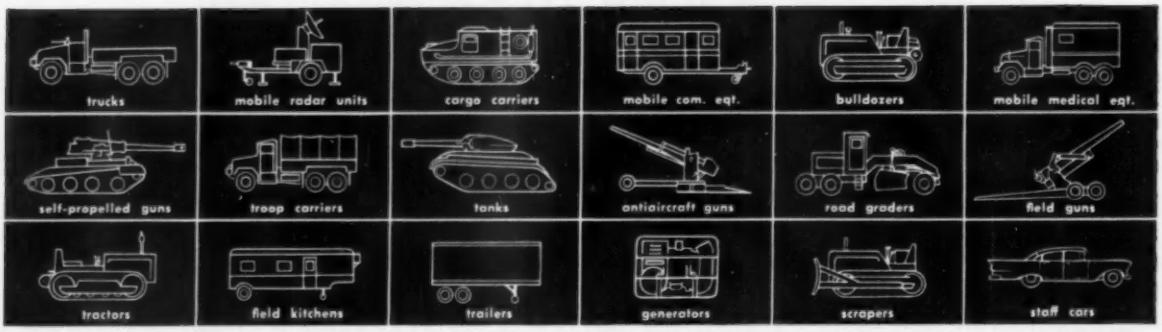
Here's proof:

Magnesium alloy wheels can "take it"



MAGNESIUM WHEELS WIN AGAIN! In 1958, and every year since 1950, the Indianapolis Motor Speedway winner has ridden to victory on magnesium wheels. So well have these wheels stood up to this rugged exhausting ordeal that every car in the '58 race was equipped with magnesium wheels.

THE MULE, M274, with its extruded magnesium platform and cast wheels is the army's first tactical vehicle to carry *more* than its own weight. Designed to operate over the toughest terrain, the M274 utilizes fully the light, strong, durable characteristics of magnesium. Because of its strength, this 900 lb. vehicle can carry 1,000 lbs. of equipment.



AIRLIFT EQUIPMENT is an excellent application for lightweight magnesium wheels. Many types of vehicles used for airlift and air-drop operations, as well as for electronic housings and other types of military equipment, are made with magnesium. Shown above is airlift equipment ideally suited for magnesium alloy wheels. For more information, contact the nearest Dow sales office or write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Department MA 1412E. 1

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NEW·NEW·NEW!

NEW·NEW·NEW!

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BIG HORSEPOWER LITTLE PACKAGE

VICKERS® "high performance" vane pump

• high speed • high pressure • high efficiency • high service life

NEW COMPACT DESIGN . . . much more horsepower than previous pumps of the same package size.

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NEW SIZES not previously available . . . answers mobile equipment designers' need for greater hydraulic horsepower in limited space.

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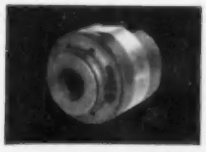
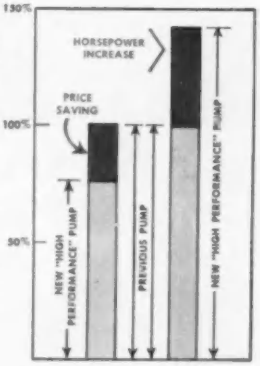
NEW REPLACEABLE PUMPING CARTRIDGE . . . all wearing parts of pump are incorporated in one replaceable cartridge. Easy field replacement without removing pump from its mount. Cartridges available in kit form.



MORE HORSEPOWER PER DOLLAR

The graph at right makes a comparison between the new Series 35 "High Performance" Pump and a previous pump of the same delivery capacity. Note the substantial increase in maximum horsepower...over 40%! This power increase is accompanied by a price saving and by a package size reduction of almost one third!

This is the second unit released in the new complete line of "High Performance" Pumps (both single and double). The first (Series 25) is available in 12, 14, and 17 gpm sizes (at SAE rating of 1200 rpm and 100 psi). The three sizes offered in the new Series 35 pump are 21, 25, and 30 gpm. Characteristics are given in table.



Model Number	Delivery-GPM 1200 RPM 100 PSI	Delivery-GPM 2000 RPM 2000 PSI	Input Horsepower @ 2000 RPM 2000 PSI	Package Size†	Weight
2V21A-**10	20.7	31.5	43.9	L. 6 15/16" W. 5 1/2" H. 6"	50 Lb.
2V25A-**10	24.2	37.4	52.0		
2V30A-**10	29.5	45.5	63.2		

†Exclusive of Shaft Extension and Mounting Lobes

8145A

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Corbin self-tightening hose clamps were designed with the assembly line in mind. They install in seconds — completely eliminate need for nuts, bolts, screws or sealants.

Corbin hose clamps are made of tough spring steel which maintains a powerful circle of pressure around hose fitting. Once on they're tight — stay that way for the life of the hose, hot or cold. Non-electrolytic process used in plating abolishes risk of hydrogen embrittlement.

Corbin clamps are backed by 15 years of field-use and improvement. Specify self-tightening hose clamps by Corbin. — there's a size for every make of car. Fact folder HC18 gives full details and specifications. Corbin Hose Clamp Div., The American Hardware Corp., New Britain, Connecticut.

CORBIN **Self-tightening HOSE CLAMPS**

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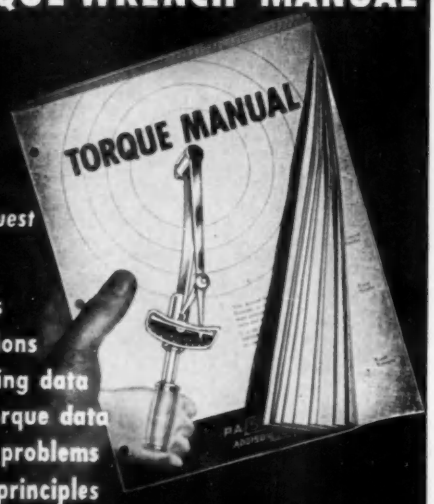
"TORQUE WRENCH" MANUAL



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Applications
Engineering data
Screw torque data
Adapter problems
General principles

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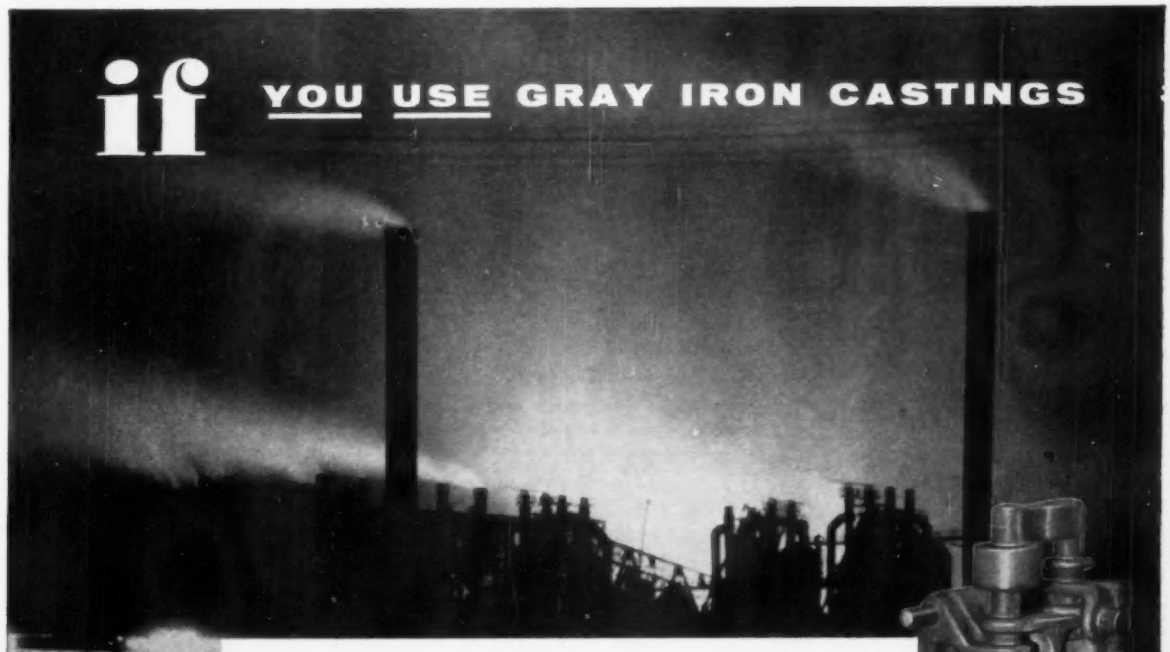

and are seeking QUALITY...

Shown is the core of a hydraulic valve casting. A typical example of an intricate casting where quality is paramount.

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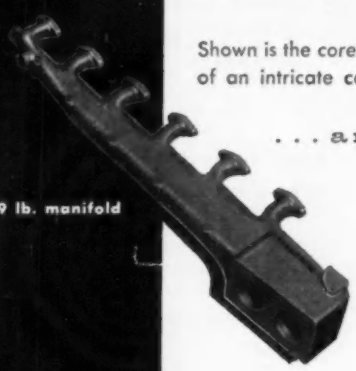

49 lb. manifold

We realize your production *depends* on prompt, promised deliveries by your suppliers. Our business was founded and has grown because of the service we have constantly maintained.

and assistance in solving really technical problems

We have been making castings for over sixty years, but do not depend entirely on this valuable experience of time. We employ 3 graduate metallurgists in a modern laboratory who keep constant watch over our metals and foundry sand. And, of course, their vast knowledge is always available to help you solve your design or casting problems.

160 lb. radiator tank

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Power Press Brake 1

Bulletin 90 Supplement gives data on the 15-ton power press brake manufactured by Niagara Machine & Tool Works. Complete design and operating features as well as specifications are presented in the two-page folder.

Heavy Duty Foot Switch 2

A heavy-duty foot switch for use on machine tools, presses, motors, etc., is explained in a one-page data sheet. The switch features a high electrical rating, oil-tight cast iron enclosure and protective toe guard. *Micro Switch, a Div. of Minneapolis-Honeywell Regulator Co.*

Industrial Radiography 3

Bulletin 1SP5-1-8, 16 pages, describes a line of industrial radiography equipment. Information is given pertaining to isotope radiography, choosing a radiation source, exposure calculations, methods of making exposures and various types of cameras. *Curtiss-Wright Corp.*

Hydraulic Presses 4

Bulletin 130-G covers the standard line of open gap and column type high-speed hydraulic presses manufactured by *Hannifin Co.*

Servo Valves 5

Catalog 220 describes a line of flow-control servo valves for use in a wide range of aircraft, missile, nuclear and industrial applications. *Moog Valve Co., Inc.*

Tube Fabrications 6

A four page bulletin describes tube forms of special contours to meet mechanical and structural requirements for aircraft, missile fuel and control parts. *United Metal Fabricators, Inc.*

Turret Drills 7

A 12 page bulletin illustrates Models 2BH and 3BH automatic hydraulic turret drills. Details are given on how the hydraulic machines are set up for operation, pre-selected speed changes, depth control, and feed rate, for each spindle. *Burg Tool Manufacturing Co., Inc.*

(Please turn page)

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FREE LITERATURE — *Continued*

Shop Equipment 8

The Universal Vise and Tool Co. has available 24-page Catalog 9158 CJ, which covers its full line of machine vises, rotary tables, adjustable angle plates, standard set-up fixtures and the Universal Clamp-N-Jack set-up system for all types of machine tools.

Crane Control 9

Bulletin GEA-6867, eight pages, describes General Electric's "7400 Line" ac crane control. Application data, information on installation and maintenance, performance curves, an explanation of static reversing control and schematic diagrams of control systems are included. *General Electric Co.*

Parts Cleaning Units 10

Blakeslee parts cleaning equipment engineered to eliminate hand scrubbing, remove insoluble oils and penetrate inaccessible areas is pictured and described in a bulletin released by *G. S. Blakeslee & Co.*

Plating-Processing Units 11

Four-page Bulletin U-658 presents information on Uniline single-row plating and processing machines. Other types of machines for plating, etching and anodizing, pickling, phosphatizing and related processes are described. *The Meaker Co.*

Finishing Vibrator 12

Bulletin 258, 12 pages, tells about an effective method of precision finishing—the Lorco vibrator, which features a three-way vibratory action. The vibrator is available with tilting bowls for discharge or is designed for automatic conveyorized production. *Lord Chemical Co.*

Vacuum Thermocouple Gage 13

The NRC Model 521 vacuum thermocouple gage and the two-station Model 721 thermocouple gage control are described in a two-page technical data sheet. The gage and control provide direct and continuous indication of total pressure from 2500 to 1 micron absolute at either of two points. *NRC Equipment Corp.*

Metal Finishing Devices 14

A two-page bulletin describes types of machines, systems and processes used in cleaning and finishing metal products. *Cincinnati Cleaning & Finishing Machinery Co.*

Instrument Bearings 15

A complete line of thin-section ball bearings, made in precision and ultra-precision grades to dimensions of the AFBMA B-500 series, is described in 24-page catalog 59. ***Split Ballbearing, A Div. of MPB, Inc.***

Retaining Ring Catalog 16

Waldes Truarc Retaining Ring Catalog No. RR 10-58 contains descriptions and illustrations of all currently available Waldes Truarc retaining rings, pliers and accessory tools. ***Waldes Kohinoor, Inc.***

Air Distribution 17

Catalog 1635-B describes a complete line of blowers for multizone central air conditioning systems. *Westinghouse Sturtevant Div.*

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FREE LITERATURE—
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Safety Booklet 18

The Grinding Wheel Institute has issued a 24-page safety booklet entitled "Safety Recommendations for Grinding Wheel Operation." The booklet discusses such subjects as maximum peripheral speeds, strength classification of grinding wheels, definitions of maximum speeds, the effect of wheel speed on grinding action and safety guards.

Turret Lathe 19

Form 1179-A has been prepared to explain the Fastermatic Automatic Chucking Turret Lathe. The catalog fully explains basic machine principles whereby speeds, feeds and machine functions can be preselected electrically. *Gisholt Machine Co.*

Metal Hose Connectors 20

A large selection of standard flexible metal hose connectors is illustrated, described and priced in Cobra Catalog 658. *Cobra Metal Hose.*

Power Transmission 21

Bulletin 3101, eight pages, covers a line of sheaves, variable-pitch sheaves, V-belts, flat-belt pulleys, pillow blocks, flange units, take-up bearings, couplings and timing belt drives. *T. B. Wood's Sons Co.*

Thermoplastic Knobs 22

Waterbury Companies, Inc., have published a fully illustrated catalog of standard thermoplastic knobs—available in polystyrene and acetate. The knobs range in size from 5/16 to 2⅞ in. in diameter.

Production Equipment 23

A wide range of hole hog production equipment designed for cylinder boring and related operations is described in a four-page bulletin prepared by the *Moline Tool Co.*

(Please turn page)

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Metal Working 24

Bulletin SC 58M5 features a metal-working technique for the forming and/or sizing of continuous metal parts of regular or irregular shapes by expanding, shrinking, or by a combination of these operations. *Grotnes Machine Works.*

Flowmeter Data 25

A series of five specification sheets, 51-1101B-1 to 5, gives full technical data on F & P indicating and controlling instruments designed especially for use with "obstructionless" F & P magnetic flowmeters. *Fisher & Porter Co.*

Tube Expander Drives 26

Data on the complete line of Torq-Air-Matic automatic tube expander drives, including recently added heavy-duty Models B and C, is provided in an illustrated six-page bulletin issued by *Thomas C. Wilson, Inc.*

Adjustable Drill Heads 27

Multi-spindle, adjustable, universal-joint drill heads designed to convert single-spindle drill presses to multi-spindle machines are explained and described in Bulletin 7698, four pages. *Cleveland Pneumatic Industries, Inc.*

Fluid Controls 28

A two-color bulletin describes and illustrates typical Koehler/Dayton valves, accessories and control systems for the in-flight and ground support handling of oils, fuels, oxidizers and liquid or gaseous coolants. *Koehler Aircraft Products Co.*

Cold-Forged Lock Nuts 29

Descriptive literature covering a line of cold-forged featherweight lock nuts with tensile strengths of more than 125,000 psi is available from *Standard Pressed Steel Co.*

Voltage Starters 30

Design and construction features of Allis-Chalmers automatic reduced voltage starters are described in Bulletin 14B8192. *Allis-Chalmers Mfg. Co.*

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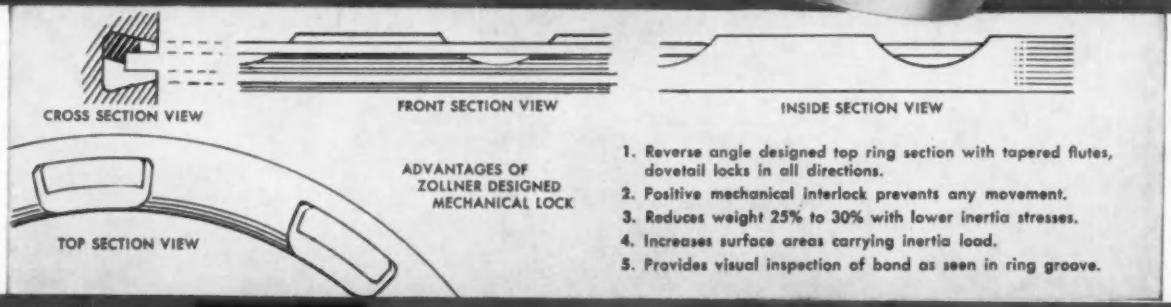

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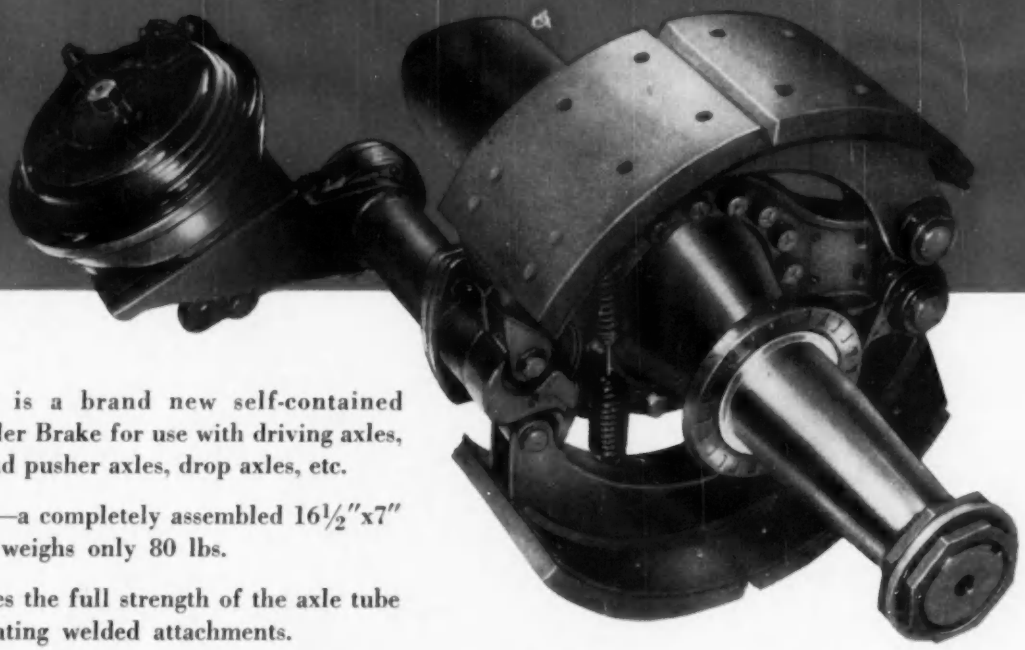

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